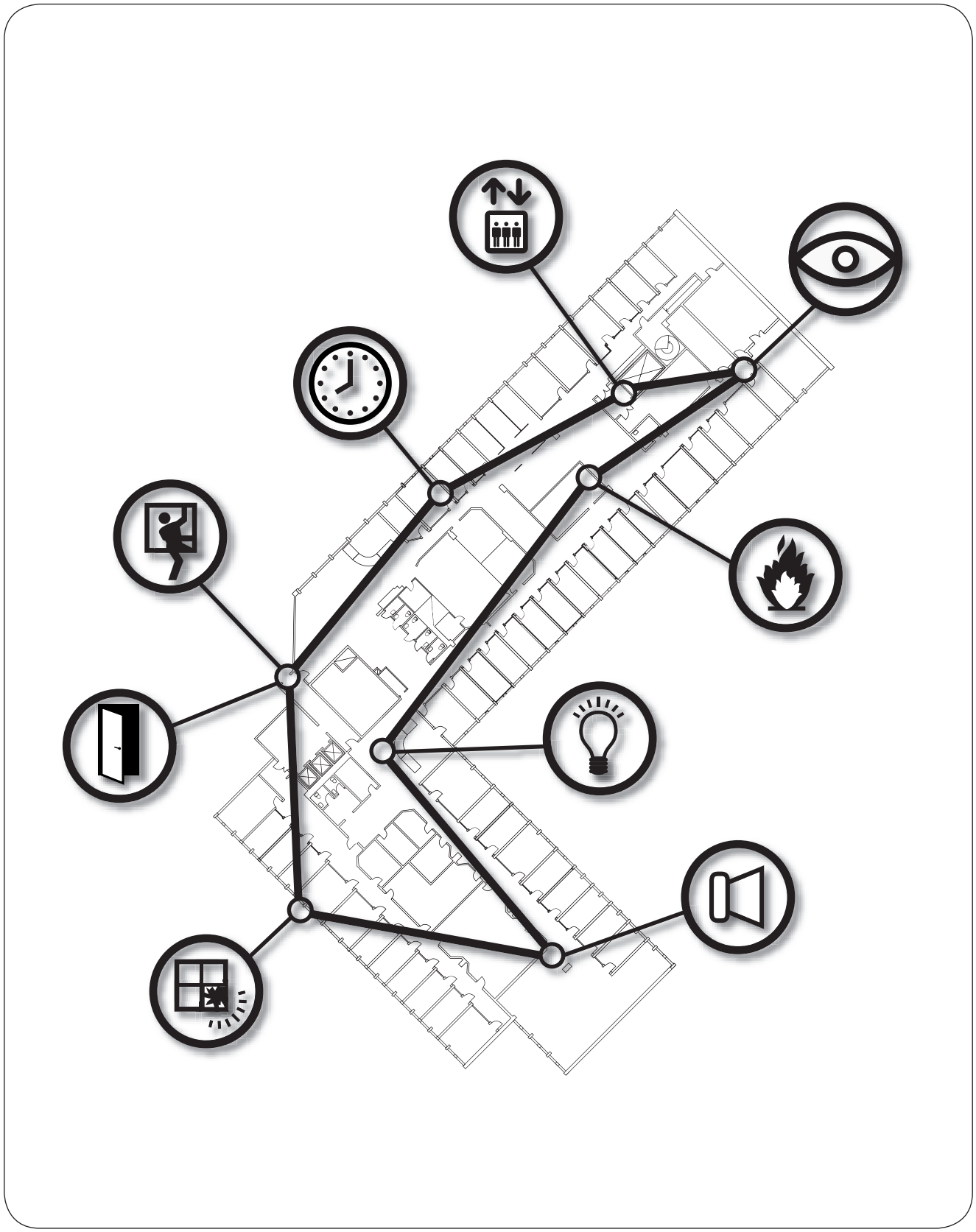
# Bewator 2010

## Installation Manual Components
## Version 4.0 - English



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# Before you start

Bewator 2010 is a system primarily used for intruder alarm, fire alert, evacuation alarm and access control, but other equipment may also be controlled or monitored, such as lighting, lifts, ventilation etc.

This manual describes how the physical components (the hardware) in the Bewator 2010 system is mounted and connected.

Some of the terms used in the manual are explained in the word list at the end of the manual, along with a more detailed description of included components.

Other manuals and documentation:

- ***Operator's Program Installation Manual***. When the hardware installation is completed, the system should be configured using the Bewator 2010 operator's program. This is where you register the areas to be defined as alarm areas, when sirens should sound, when access cards are required to open specific doors and other settings specific for a security system.
- ***Operator's Program User Manual***. When the system is configured for operation, a few additional settings remain in the operator's program, e.g. system users, card holders and codes.
- ***User manuals for included components***. There are also manuals for the E4 control panel and for the RB9160/RB9160 prox card readers.
- ***System Description***. Includes an overall description of Bewator 2010, e.g. functions, possibilities, reference installations and technical data.

In order to satisfy new requirements and suggestions, Bewator 2010 is always subject to development. New functions are added and existing functions are changed.

Bewator's aim is to focus on our customers' needs and provide the best possible support. You are welcome to contact us if you have questions or if you need help during the installation. If you have comments on our documentation, drop us a letter, mail or fax!

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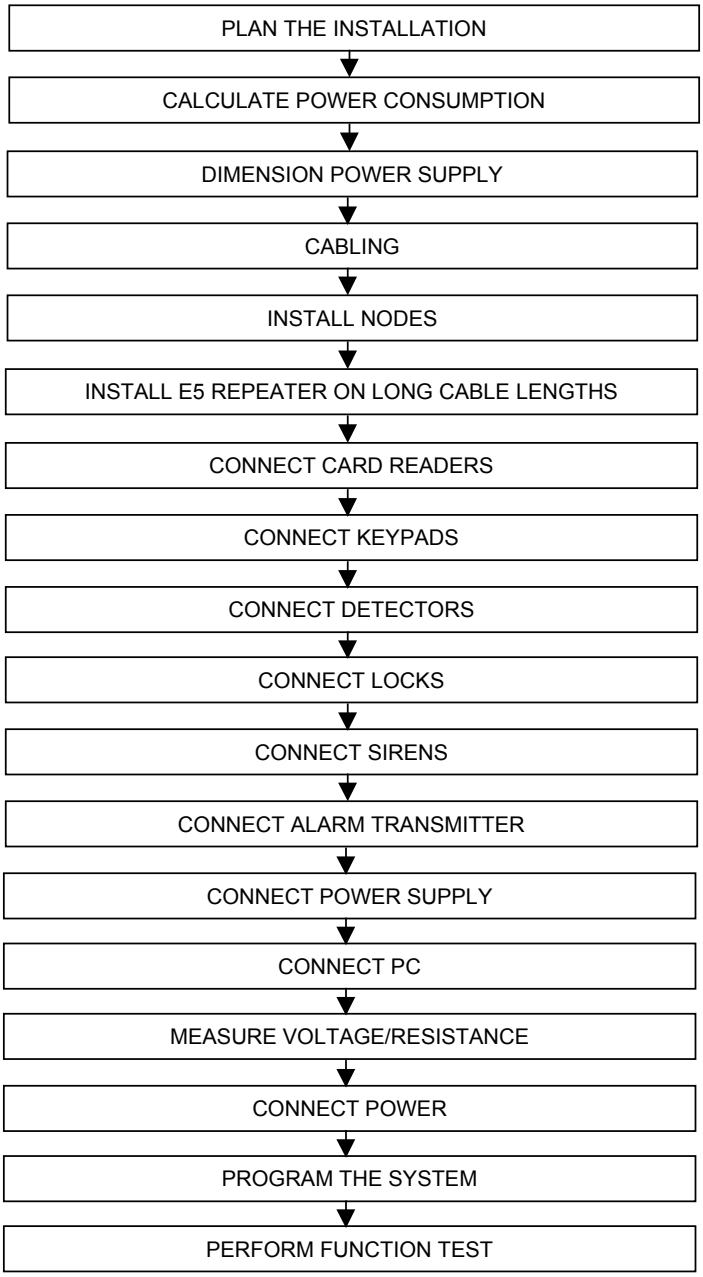
# Installation procedure

The following steps are included in the installation:




This manual also describes functions and equipment like fire door closing, automatic doors, high-voltage control (e.g. lift control), proximity readers etc. Look in the table of contents and you will find the instruction you need.

# Tools

Apart from basic tools such as wire nippers, electric drill, knife etc, the following specific tools are needed:

- Slotted screw driver, 2.5 mm. Used for terminal block screws.
- Phillips screw driver (e.g. Phillips No 1). Used e.g. for fitting and removal of node covers.
- Volt/resistance meter, e.g. a digital multimeter.

Neither mounting material (screws, plugs, resistors, cables etc) nor alarm components (door contacts, PIR detectors, sirens, locks etc) are delivered with the Bewator 2010 system.

# Plan the installation

Before you start installing it might be a good idea to plan the installation. What kind of building is it? How many nodes are needed in each area to cover connection of alarm detectors?

How many power supplies are needed? In the *Calculate the power supply* chapter you will find instructions on how to calculate the power supply to minimize power loss in the cables.

How much cable do you need? Are there several floors? Will the cables be laid out so that an E5 repeater is required? In the *Install the E5* section you will find instructions on how to connect the E5 repeater.

How do you install the nodes optimally? For example, it is easier to install the node close to the detectors and then connect the bus cable to the node, than to lay out several long detector cables.

# Calculate the power supply

To be able to function properly, all E nodes in the installation must be supplied with a voltage of 20-60V DC. In addition, most of the conventional components have to be powered. Bewator recommends that the E7 power supply (see the *Install the E7 power supply* chapter) is used but other types of power supply equipment can also be used, provided it has a high safety of operation, an automatic function for compensating charge of accumulators and an alarm function. The power supply (or power supplies), must also be able to deliver the current and voltage required by the system. Below is a guide for selecting the suitable power supply, along with recommendations on how to divide the installation into power segments for an efficient power supply.

## Dimensioning

If possible, use the same voltage level for all connected power supplies. Select the suitable voltage level on the basis of the voltage feed requirements of included components. All E nodes require 20-60V DC. 24V DC power supplies are recommended, since these can also be used to power electric locks, relays and many other 24V components in the installation.

By selecting a higher voltage, the current is decreased and voltage drop on long distances is reduced. When you select the size of the power supply equipment, a more comprehensive investigation should have been performed by the installation projector before the installation is started.

> ***Note!*** Always make a new calculation if the contents and design of the installation is changed.

### Security level

Decide the suitable security level based on the following criteria:

- Does the installation require decentralized power supply from a security point of view?
- Is the voltage sufficient?
- Would only one power supply be too vulnerable?

## Fusing

Large power supplies, fused with big fuses, require thick cables. The table below shows the maximum fusing for different cable dimensions.

| Cable area | Maximum rated current for fusing |
|---|---|
| 0.2 $mm^2$ | 2A |
| 0.4 $mm^2$ | 4A |
| 0.5 $mm^2$ | 6A |
| 1.5 $mm^2$ | 10A |

The most common tele cables can be fused according to the table below:

| Cable type | Maximum rated current for fusing |
|---|---|
| EKKX | 2A |
| ELAKY | 2A |
| EKKR 0.6 | 2A |
| EKKR 1.0 | 6A |
| RKKR | 4A |

If the RB2010 cable with 1.0 $mm^2$ current feed wires is selected, it can be fused with 6A. The conclusion is that it is often wise to use several power supplies, placed in different segments of the installation.

To be able to calculate the size of the power supplies, all sources of power consumption should be summed up. (In the *Technical data* chapter you will find each E node's power consumption).

To calculate the power consumption for an E2 in use, sum up the power consumption of all feeded components and divide the result with the utilization coefficient in the DC/DC converter, i.e. approximately **0.7**.

***Example:*** Three PIR detectors are connected to an E2. The detectors are powered from the E2's 12V output. Each PIR detector uses 27mA at 12V.

This corresponds to 0.32W. Multiply 0.32W with 3. The result is 0.96W.

0.96W divided with the DC/DC converter's utilization coefficient 0.7 = 1.37W. Add the E2's own consumption, which is 1.7W. The result is 3.07W. To calculate the power consumption, divide the power (3.07W) with the E2's voltage feed. Suppose 24V is used. 3.07W divided with 24V = 128mA at 24V. The E2 in the example consumes 128mA altogether.

## Reserve power

Some calculation remains to be done. Should the alarm system be able to function as normal in case of power failure or sabotage? For how long should the system be able to operate? 1 hour, 3 hours, 12 hours? To be able to guarantee reserve power, accumulators must be connected. These should be dimensioned with regard to the total maximum power utilization and the time during which the accumulators should be able to deliver current.

***Note!*** The power supplies will not be able to recharge the reserve batteries within an acceptable time period if the power supplies' specifications are exceeded.

## Calculate voltage drop

You should also calculate if the cables will cause voltage drop, putting the components' function at risk. If the installation contains long cable lengths and a thick current cable is used, the installation will probably be working fine. On the other hand, voltage drop may occur if the bus length exceeds 200 m and/or the component cables exceed 50 m and are too thin.

**Formula for calculating voltage drop: U = R x I**

**U** = Voltage drop (volt)

**R** = Cable resistance (ohm)

**I** = Current load (ampere).

**R**, the cable resistance, can be found in the table below or by reading the cable manufacturer's specification.

| Cable type | Area | Cable resistance (R) |
|---|---|---|
| EXXX | 0.2 $mm^2$ | Ca 97 ohm/1000 m |
| ELAKY | 0.22 $mm^2$ | Ca 67 ohm/1000 m |
| EKKR | 0.75 $mm^2$ | Ca 23 ohm/1000 m |
| RB2010 | 1.0 $mm^2$ | Ca 17 ohm/1000 m |

When the cable resistance is calculated, the installed cable length should be doubled, since the current always travels to the unit and back.

**I**, the current load, is obtained by summing up all connected equipment's power consumption according to the earlier description.

**U**, the voltage drop in volts.

***Example:*** The cable length is 30 m. The cable type is EKKX 0.2 $mm^2$ and utilized current is 1.2A.

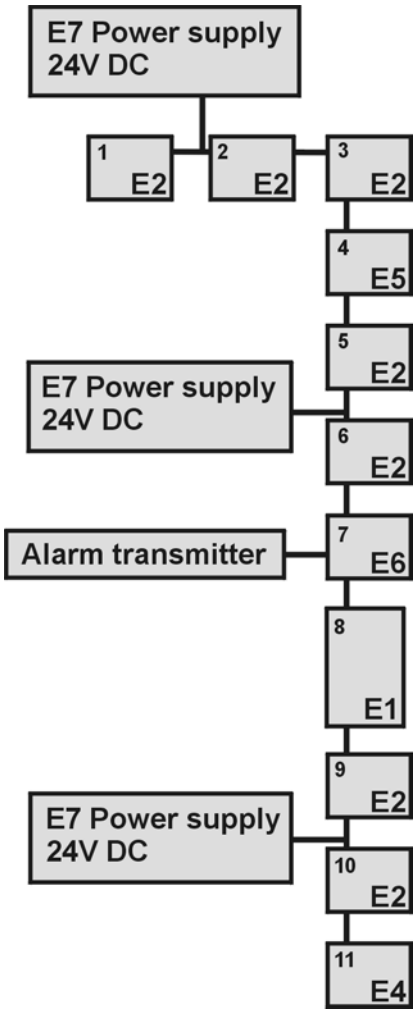
Cable length x 2 = 60 m. 60 m x resistance 0.098 W/m = 5.88 W.

1.2A x 5.88 W = 7.06V voltage drop! Suppose the installation is powered with a 24V power supply. The voltage obtained at the end of the cable in the example is 24V – 7.06V. Only 16.94V remains, which is not sufficient to support connected equipment.

Instead, if the RB2010 cable with a 1.0 $mm^2$ area is used, the voltage drop is 1.22V and 22.78V remains. Apart from the above calculation, you should also measure the voltage at each unit to make sure they will function properly.

## Current segmentation

In short, current segmentation means distributing the power supplies evenly in the installation. By connecting the incoming bus cable to the left and the outgoing to the right (or vice versa), the units can be divided into different current segments.




**When the load is changed due to restructuring or expansion (e.g. extra card readers), the jumpers in the nodes can be moved to determine which units should be powered by the E7 power supply. See the sections *Install the E1*, *Install the E2V*, *Install the E2VL*, *Install the E5*, *Install the E6* and the chapter *Install the E7 power supply*.**

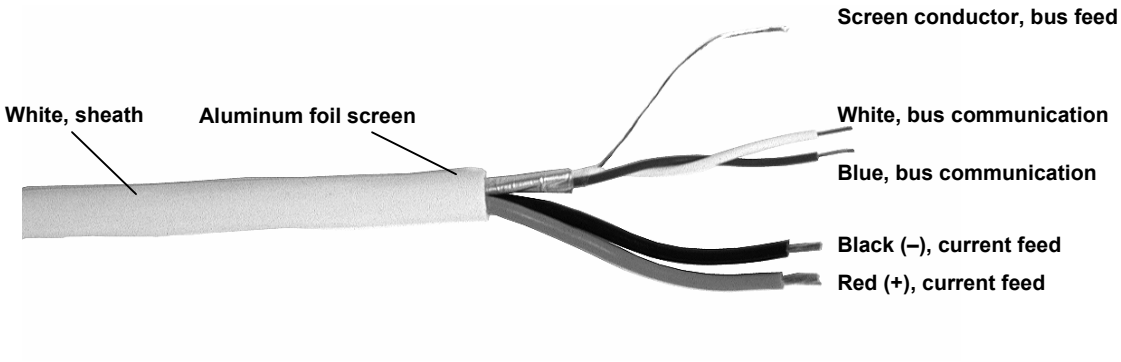
# Cabling

## The bus cable

For the nodes to be able to communicate with each other, they are connected with a bus cable. In all connection examples in this manual, Bewator's **RB2010** cable is used. This cable is exclusively developed for Bewator 2010's requirements and contains both bus communication pairs and current feed pairs. The cable's sheath is halogen free.

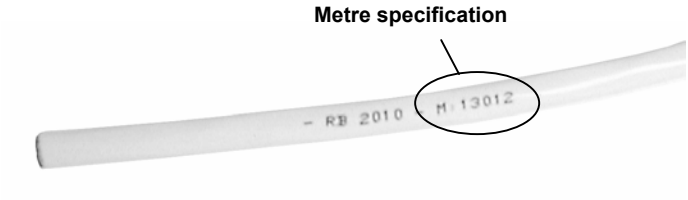
### Cable components

The RB2010 cable consists of one bus communication pair and one current feed pair. The communication pair is pair-twisted to minimize near-end crosstalk. For this reason, the communication pair's twisting should be kept all the way to the nodes' terminal blocks, to obtain an even quality. The current feed pair is also pair-twisted to reduce disturbance and crosstalk. All types of pair-twisted tele cables can be used in Bewator 2010, e.g. EKKX or ELAKY. However, keep in mind that the maximum length of the bus is significantly reduced if a low-quality cable is used.




### Metre specification

The bus cable is marked with the cable's type along with a number series, increased with each metre. Thanks to the metre specification, it is easy to keep track of how many metres have been used in the installation, or the lenght of a specific bus cable. This is also useful if you plan to connect repeaters (E5), when you calculate the power supply or if you need to know the total bus cable length in order to stay within the system's limit.

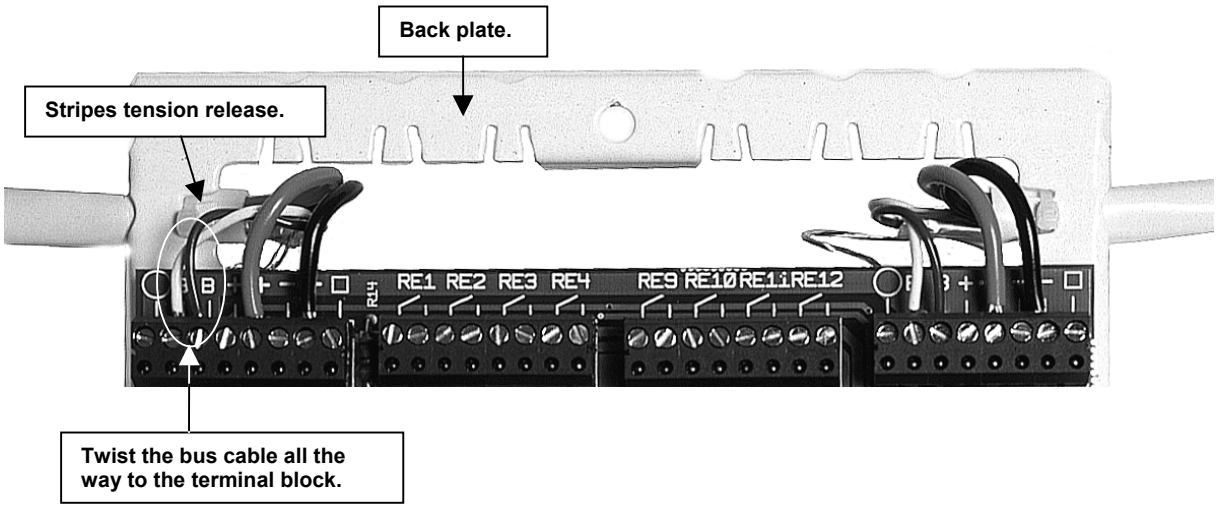


## Lay out the cables

First, lay out all cables. The cables should always be laid out within an alarm protected area. Then install the nodes' back plates (with adhering circuit boards) over the cables, so that the cables fit in the back plate's cable entries and end up in the back plate's rectangular hole at the top (see the installation instructions for each node).

Carefully peel the bus cable approximately 50 mm, so that neither current feed pairs nor communication pairs are damaged. A Bewator 2010 screw driver blade can be used for measuring (length: approx 50 mm.)

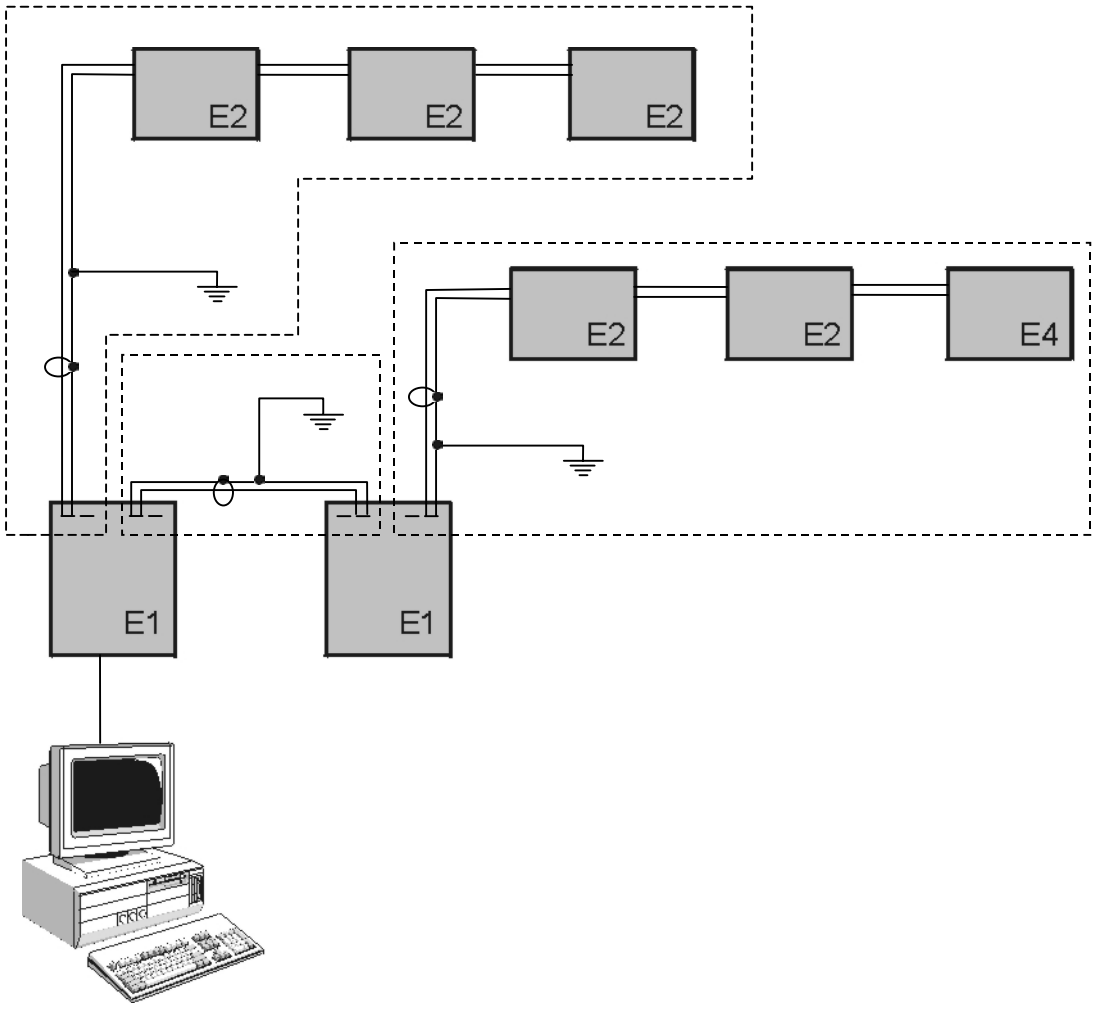
The units' housings are designed to simplify expanding an existing installation with new units. Simply place the housing over the bus cable where the unit should be installed, and cut the cable in the middle of the rectangular hole. The example below shows how this has been done. The cable ends fit perfectly. Then connect the cables to the terminal blocks.


Back plate.
Stripes tension release.
RE1 RE2 RE3 RE4 RE9 RE10 RE11 RE12
Twist the bus cable all the way to the terminal block.

# *Earthing*

If the bus cable is screened and the screen is connected to the nodes, the screen should be connected in **one** earthing point for each cable segment. It is very important that no earth streams are flowing in the screen. Check, by measuring, that the screen does not connect against different earthing objects (see the *Measuring* chapter). A faulty installation can cause disturbance or an entire loss of communication.

If a screened cable is connected to the nodes, the screen can be connected like this:

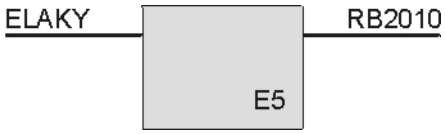



In the example above, there are three different cable segments (within dotted frames). The screen in each cable segment should be connected to **one** earthing point. The E1s in the example are connected to each other through a backbone (see the *Example of E1s in a backbone* section).

# Cable types

Bewator 2010 can use all types of pair-twisted cable. Low-quality pair-twisted cable or a mix of different cable types is however not recommended.

If cables are mixed, connect the E5 unit as a link between the cables (also see the *Install the E5* section):




Examples of bus cable types are EKKX or ELAKY. Remember that each wire in an EKKX has a total area of 0.2 $mm^2$ (ELAKY 0.22 $mm^2$). These copper wire areas can only be fused with a maximum of 2A. For safety reasons, check your country's high-voltage regulations. Also see the *Calculate the power supply* chapter. Use one pair for bus communication and twist the remaining wires for current feed.

# Bus topology

Bewator 2010's bus cable can be laid out in different ways, i.e. several different topologies are possible. This section describes the following topologies:

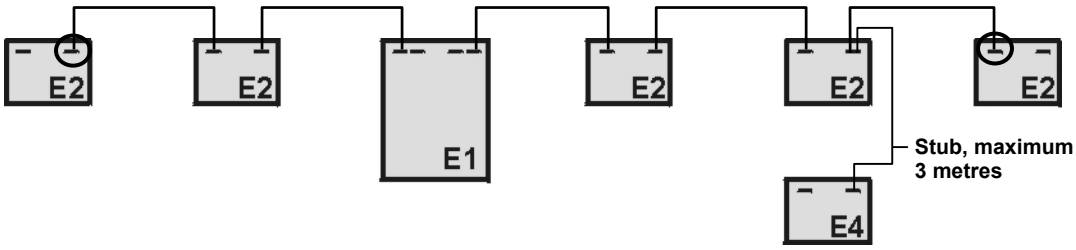
- Double-terminated topology
- Free topology
- Bus with several cable segments

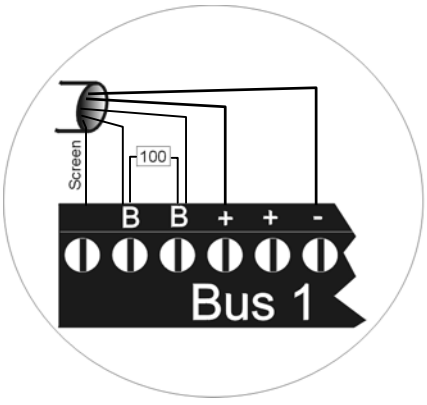
## Double-terminated topology (linear bus)

This topology gives maximum performance. The cable length can be 1800 m if the RB2010 cable is used and if no more than 64 nodes are connected per cable segment. A certain amount of diverging cables is allowed, but each individual stub (branch) must not exceed 3 metres.

The picture below shows **one** cable segment (also see the *Bus with several cable segments* section).

In a linear bus, two 100 ohm resistors should be used for termination in each end of the net. Together, this gives an impedance of 50 ohm.



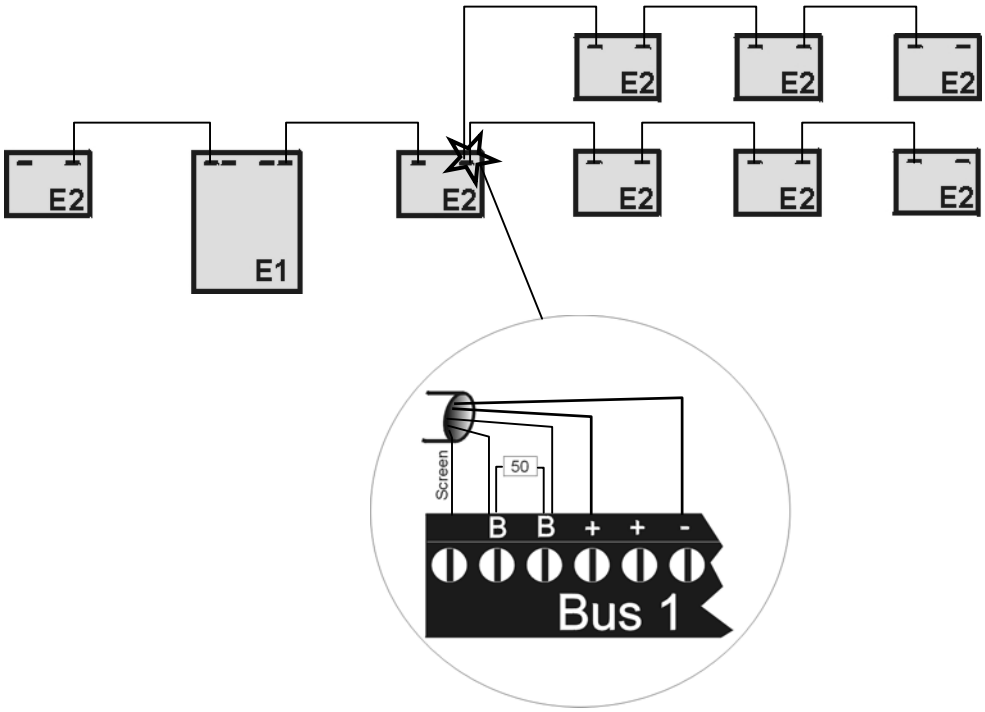

**Connect a 100 ohm resistor to the encircled bus connections, according to the detailed illustration to the left.**

**Tip! You can also connect the resistors to the free terminal blocks in the end nodes.**

## Free topology

All other wiring apart from double-terminated topology is regarded as free topology. When free topology is used, the maximum cable length is 500 m if the RB2010 cable is used and if no more than 64 nodes are connected per cable segment. The total cable length is the amount of bus cable used (including stubs) within one cable segment. The picture below shows **one** cable segment (also see the *Bus with several cable segments* section).

If the installation consists of one or several stubs (more than 3 m), try to achieve an even distribution and best possible symmetry in the bus net. The characteristic impedance in a LON-FTT10 system is 50 ohm. Therefore, make a 50 ohm termination at a point in the network where the approximate electrical centre is.

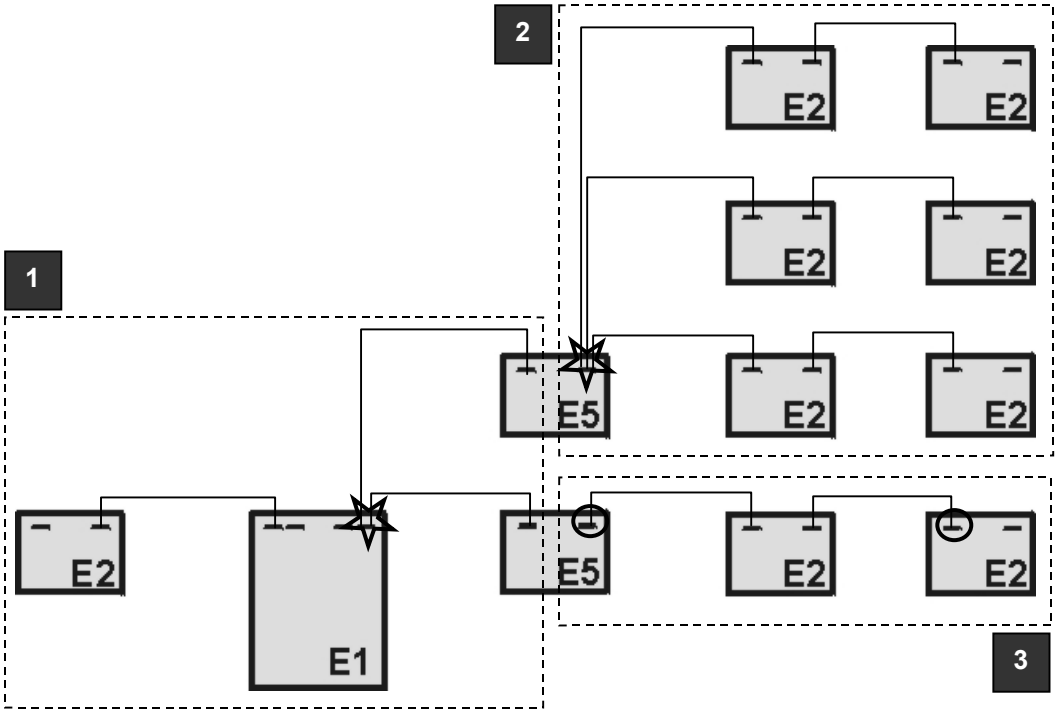


## Bus with several cable segments

The communication on the bus is limited by the total cable length and the number of connected nodes. If the bus contains many branches, the E5 repeater should be connected. The E5 divides the bus into galvanically separated cable segments. If there is a short-circuit or interruption in one cable segment, the rest of the cable segments will still be working fine.

All the rules mentioned earlier then apply to each segment. Thus, you can connect a segment using free topology to another with double-terminated topology. This way you will obtain maximum performance in each segment.

The example below shows how the E5 unit can be connected to join cable segments with different topologies. Also see the *Install the E5* section.



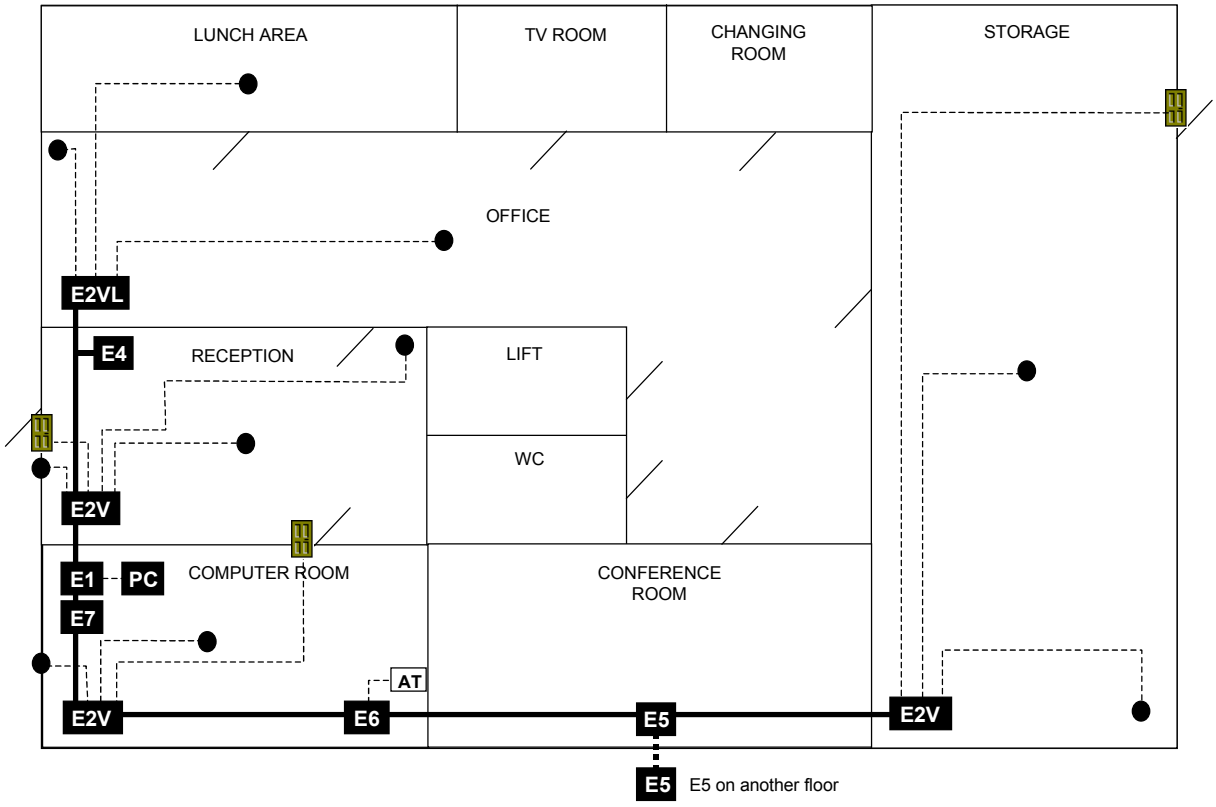

1 Isolated cable segment with free topology. Terminate with a 50 ohm resistor in the cable segment's approximate balance position, here in the E1 (marked with a star).

2 Isolated cable segment with free topology. Terminate with a 50 ohm resistor in the cable segment's approximate balance position, here in the E5 (marked with a star).

3 Isolated cable segment with double-terminated topology. Terminate with a 100 ohm resistor at each end.

# Install the nodes

This chapter describes how to mount and connect the different nodes. The illustration below shows an example of how the nodes can be placed.




| Node | Function |
|---|---|
| **E1** | The central unit in the Bewator 2010 system, i.e. the unit used as a link between the LON net and the PC. Bewator 2010 can function without a connected PC, but the PC is needed to configure and administer the system. |
| **E2V** | Universal node for both alarm and access control. Card readers, keypads, electric locks, sirens and alarm components can be connected to E2V, which is suitable for combined burglar alarm and access control installations. |
| **E2VL** | Node for connection of alarm components. Similiar to E2V with the exception that is lacks inputs for card readers/keypads and that it has only two relay outputs. |
| **E4** | The system's control panel. By logging in to the E4, security personnel, operative staff and similar can quickly and easily display information about events, silence sirens etc. |
| **E4B** | Control panel intended for fire personnel and other authorized personnel to view and act on fire and evacuation alarms. |
| **E5** | Repeater used to isolate different cable segments in a bus with many branches. |
| **E6** | Using the E6 node, up to 8 optional functions can be controlled via voltage free relay outputs. By defining the outputs in the operator's program, each relay output can be set to control different devices, e.g. lifts, lighting, ventilation, pumps etc. |
| **E7** | The system's power supply. One or several E7 units can be connected to Bewator 2010 to power the installation with a voltage of 24V DC. How the E7 is installed is described in the *Install the E7 power supply* chapter. |

# *Mounting – general description*

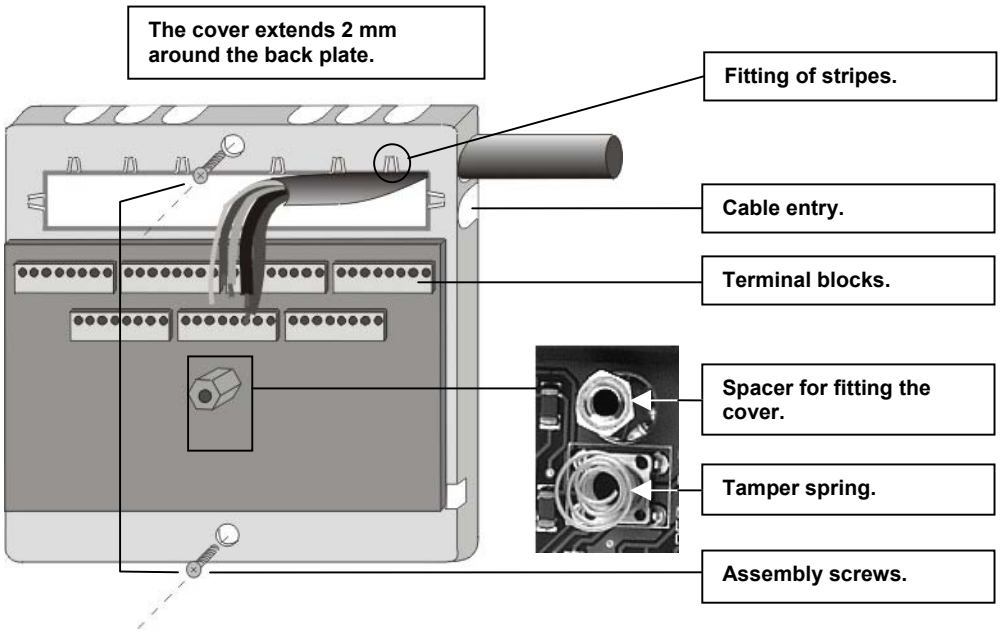
This section provides a general description of how the nodes are mounted. The following sections describe the nodes in more detail. Remember the following when you mount the nodes:

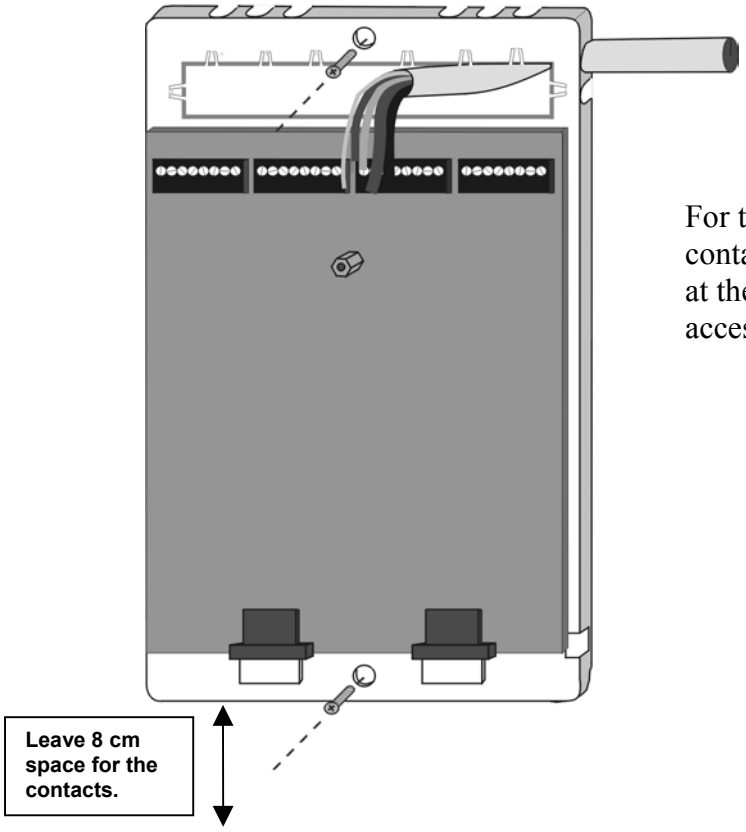
- Mount the node on a flat surface, within an alarm protected area.
- The node should be easily accessible for service.
- Nodes to be used for connection of alarm detectors, electric locks etc should be mounted as close to these components as possible.
- Mount the control panels (E4 and E4B) at a suitable height, so that everybody (irrespective of length) can read the display. To simplify reading, try to avoid reflexes in the display.
- Check that the tamper plug is in place (black rubber plug on the back of the back plate).
- Carefully fit the cover so that the tamper switch spring is intact and can affect the tamper switch (a clicking sound should be heard).

## *Mount the back plate*

Mounting the back plate and fitting the cover is done in the same way for all nodes. Below, the E2 node is used as an example.

Mount the back plate with the adhering circuit board over the cables so that they fit in the back plate's cable entries. The cables should end up in the back plate's rectangular hole at the top.

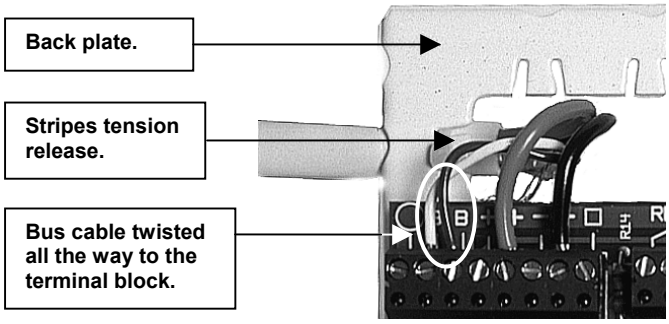




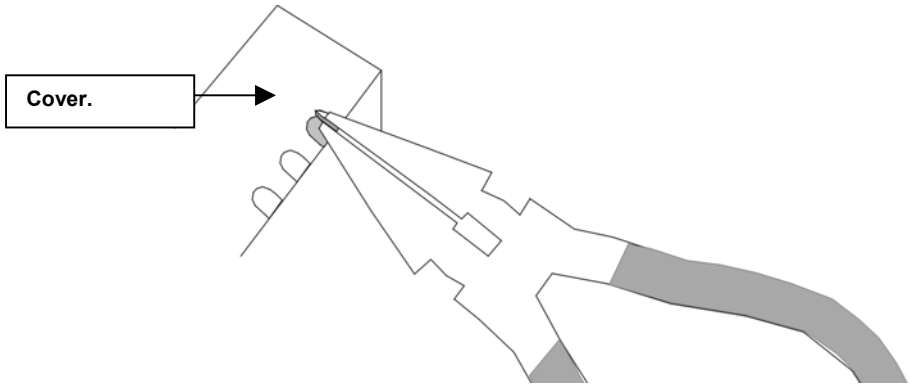

For the E1, make sure that the contacts to the communication ports at the bottom of the unit are easily accessible.

Fasten the back plate using two screws (four screws for E4).

Connect the cables to the terminal blocks. Exactly how the cables are connected is described in more detail in the separate node sections following this section.



The cover has prepunched positions for cable entries. Use a pair of pliers and carefully break loose the metal at the cable entry holes you wish to use.




Finally, fit the cover over the back plate.

## Earthing

If the bus cable is screened and the screen is connected to the nodes, the screen should be connected to an earthing point in **one** place (also see the *Earthing* section in the *Cabling* chapter). It is very important that no earth streams are flowing in the screen. Check, by measuring, that the screen does not connect against different earthing objects (see the *Measuring* chapter). A faulty installation can cause disturbance or an entire loss of communication.

# Install the E1

The E1 is the central unit in the Bewator 2010 system, i.e. the unit used as a communications link between the LON net and the PC.

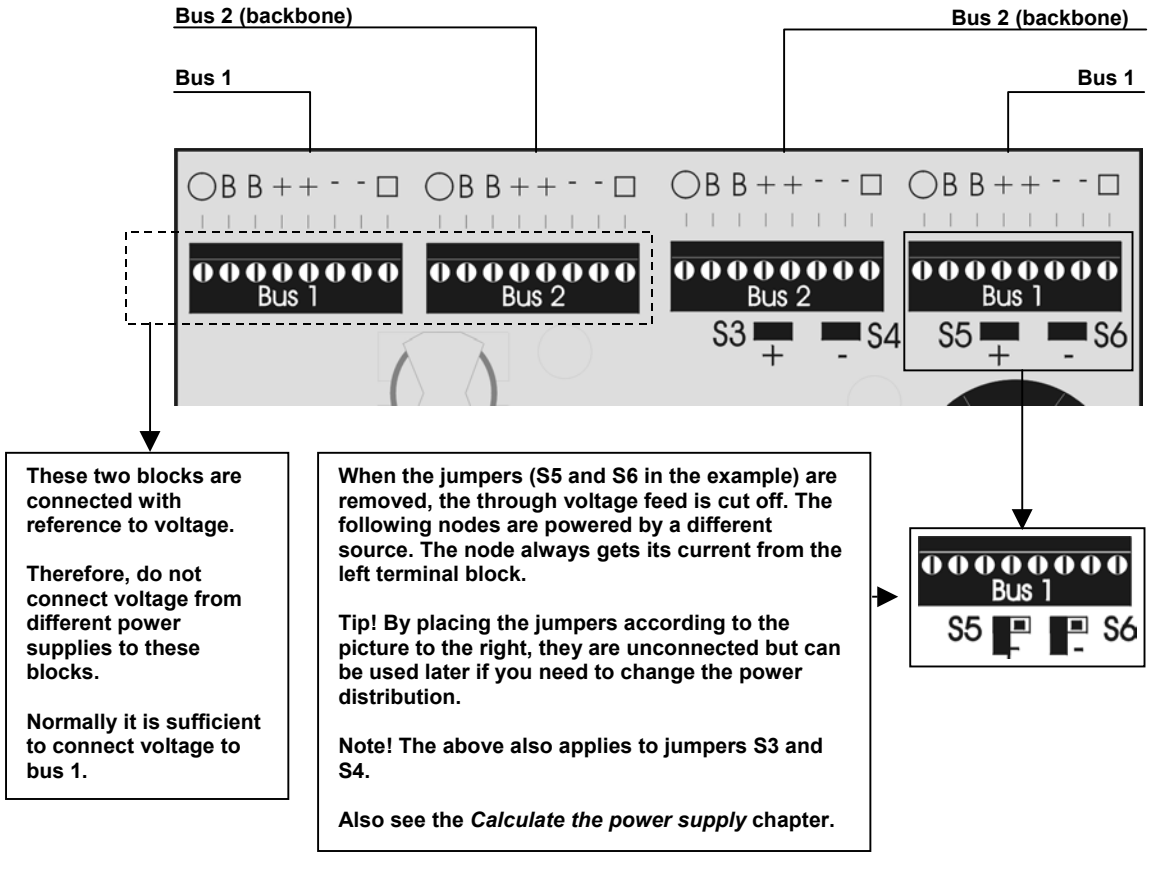
If a PC is permanently connected to the E1, place it as close to the E1 as possible (maximum 15 m cable distance). If the distance is longer, a modem can be used. If a short range modem (RS232 modem) is used, the maximum cable length is approx. 1000 m (read the modem's technical specification). For dial-up modems, a telephone connection must be installed in the unit's absolute vicinity. Contact Bewator if in doubt.

Instead of connecting the E1 to a PC, it can be connected to an ED-10 modem (see the section *Connect the E1 to an ED-10 modem or PC* further on in this section).

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter.

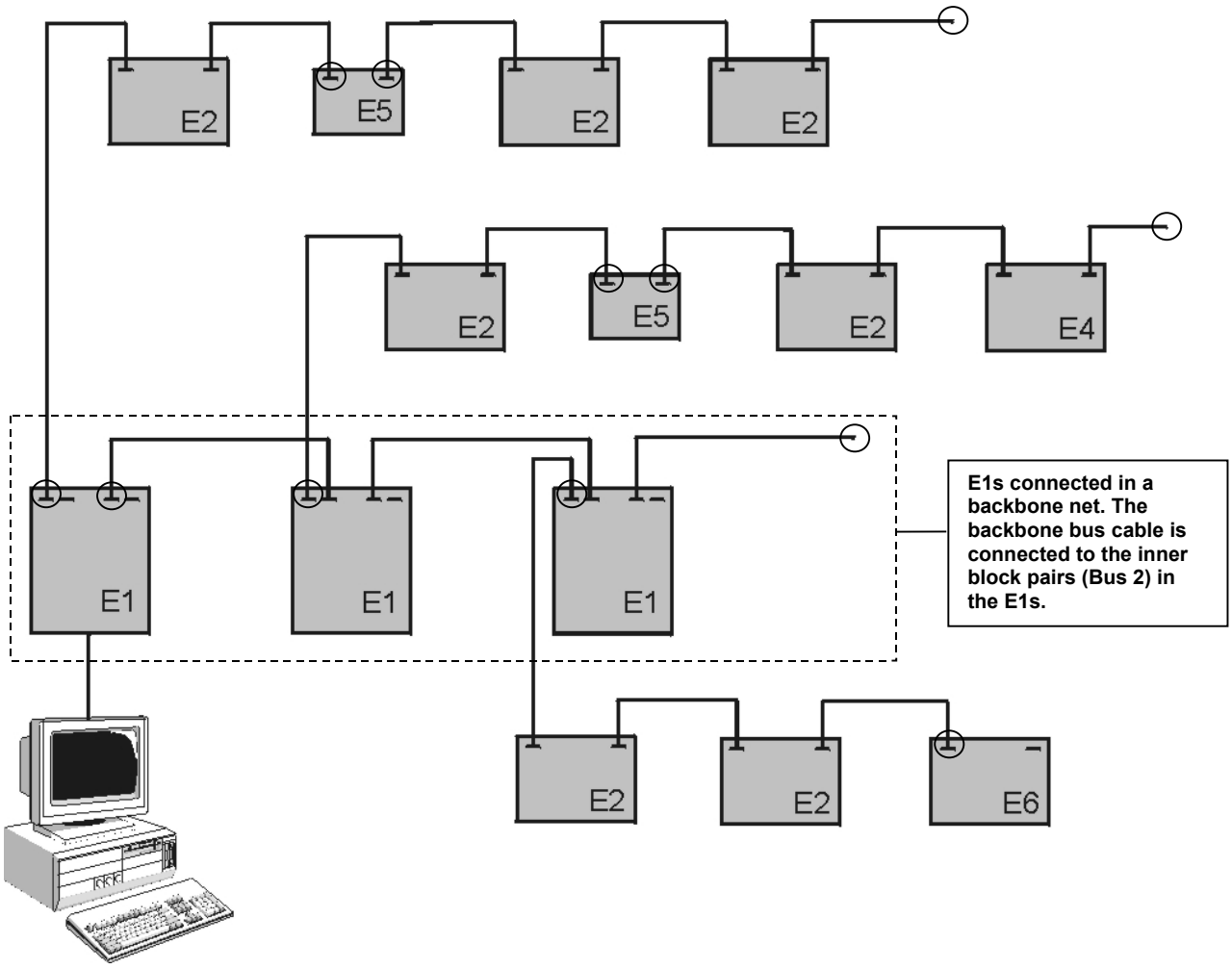
## Connect the bus cable

The E1 has two types of bus connections. Bus 1 is used for connecting local nodes, E2, E4, E5, E6 and E7. Bus 2 is a backbone net for central communication between several E1s (see example on the next page).


Bus 2 (backbone)
Bus 1
Bus 2 (backbone)
Bus 1
Bus 1
Bus 2
Bus 2
Bus 1
S3
S4
S5
S6
Bus 1
S5
S6
These two blocks are connected with reference to voltage.
Therefore, do not connect voltage from different power supplies to these blocks.
Normally it is sufficient to connect voltage to bus 1.
When the jumpers (S5 and S6 in the example) are removed, the through voltage feed is cut off. The following nodes are powered by a different source. The node always gets its current from the left terminal block.
Tip! By placing the jumpers according to the picture to the right, they are unconnected but can be used later if you need to change the power distribution.
Note! The above also applies to jumpers S3 and S4.
Also see the Calculate the power supply chapter.

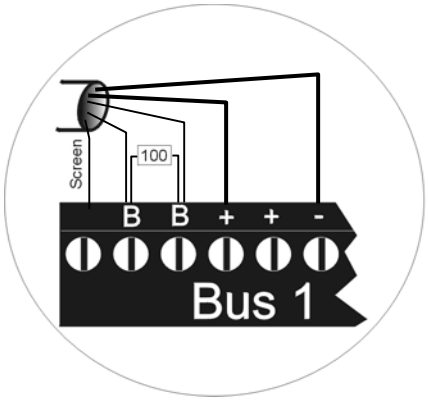
## *Example of E1s in a backbone*

In large installations, it is fully possible to connect several E1s in a **backbone** (also see the *Install the E5* section).



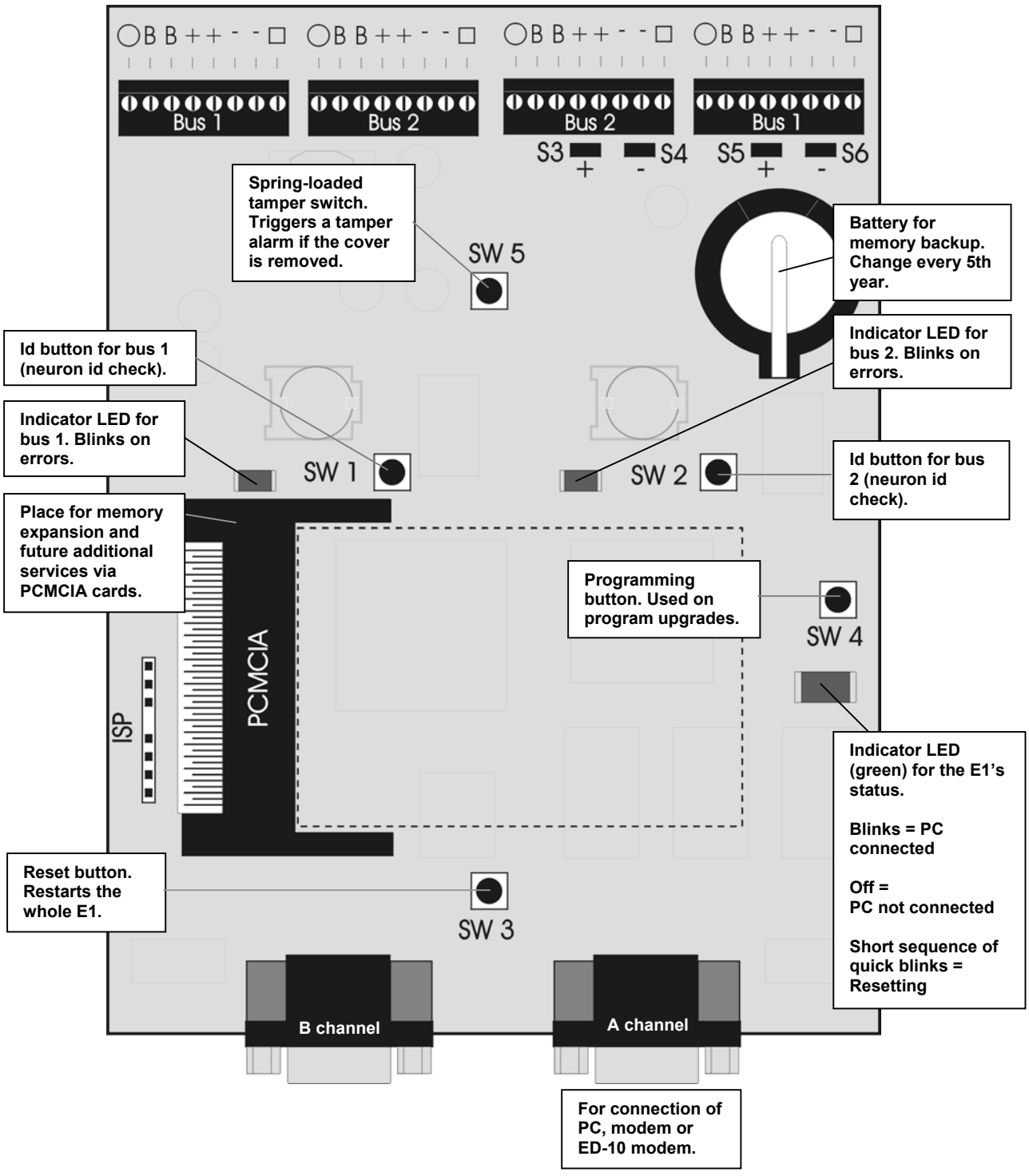

**E1s connected in a backbone net. The backbone bus cable is connected to the inner block pairs (Bus 2) in the E1s.**

**The picture to the right shows how to connect a 100 ohm resistor between the bus inputs. See the encircled connection points in the illustration above.**



## Switches and indicators

The following switches and indicators are found on the E1 circuit board:


Bus 1
Bus 2
Bus 2
Bus 1
S3
S4
S5
S6
Spring-loaded tamper switch. Triggers a tamper alarm if the cover is removed.
SW 5
Battery for memory backup. Change every 5th year.
Id button for bus 1 (neuron id check).
Indicator LED for bus 2. Blinks on errors.
Indicator LED for bus 1. Blinks on errors.
SW 1
SW 2
Id button for bus 2 (neuron id check).
Place for memory expansion and future additional services via PCMCIA cards.
PCMCIA
Programming button. Used on program upgrades.
SW 4
ISP
Indicator LED (green) for the E1's status.
Blinks = PC connected
Off = PC not connected
Short sequence of quick blinks = Resetting
Reset button. Restarts the whole E1.
SW 3
B channel
A channel
For connection of PC, modem or ED-10 modem.

On the back of the back plate, a tamper plug (black rubber plug) is fitted. The tamper plug triggers a sabotage alarm if the unit is forced off the wall.

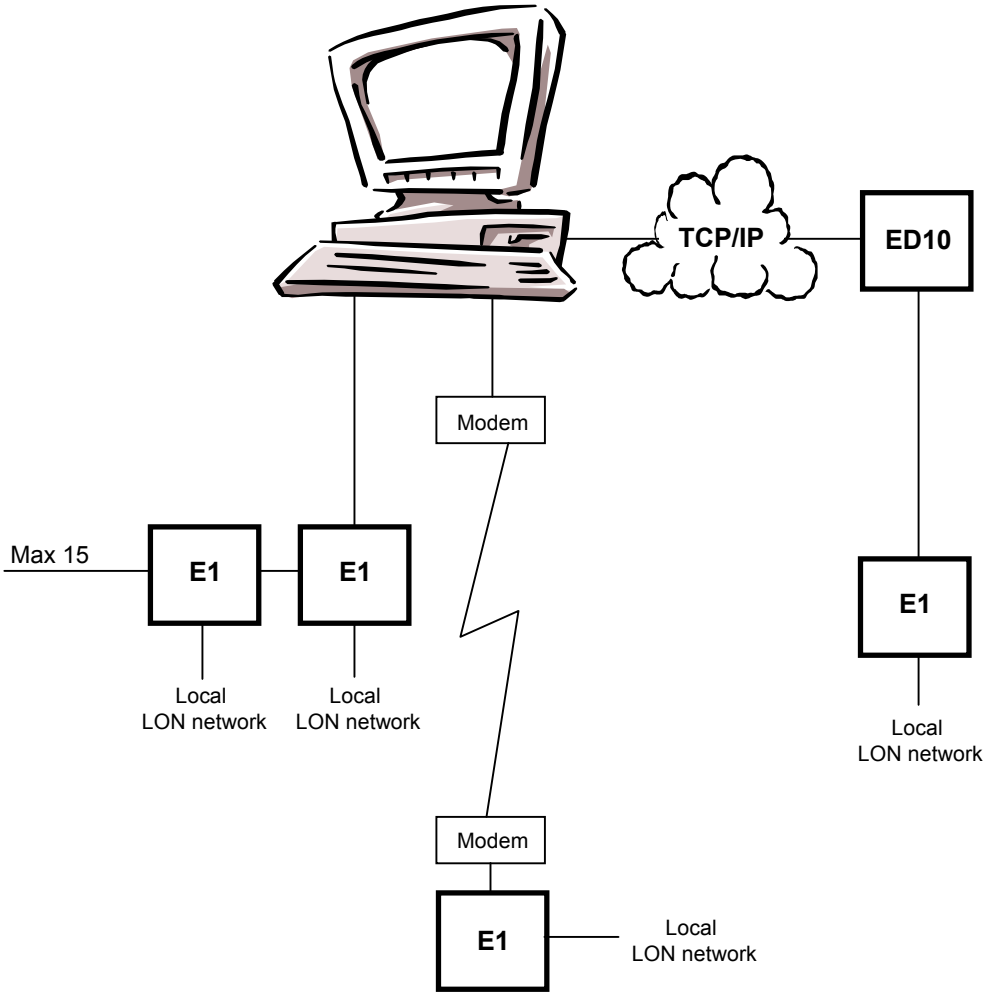
## *Connect the E1 to an ED-10 modem or PC*

To be able to program the system, at least one of the E1s in the installation must be connected to either a specific PC (with the **Bewator Communications module** installed) or to an ED-10 modem connected to the computer network via TCP/IP.

If the E1 should be connected to a PC, connect a serial cable between the E1's A channel and one of the PC's COM ports (also see the *Connect a PC* chapter).

If the E1 should be connected directly to a computer network, connect a serial cable between the E1's A channel and an ED-10 modem. Then connect a networking cable between the ED-10 modem and a network outlet. This way, the ED-10 modem replaces the PC as a link between the computer network and the system's hardware.

In the *Operator's Program Installation Manual* you will find instructions on how to set up the proper IP address for each unit.



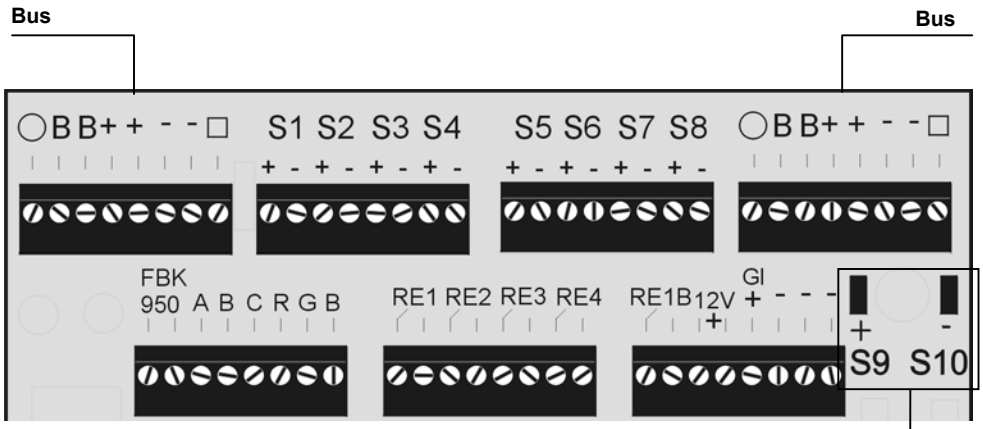
# Install the E2V

The E2V is a universal node, for both alarm and access control. Card readers, keypads, electric locks, sirens and alarm components can be connected, which is suitable for combined intruder alarm and access control installations. The E2V has 8 inputs, where each loop can be selected as either a double-balanced loop (see the *Alarm components* chapter) or a current loop (for glass breakage and smoke detectors).

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter.

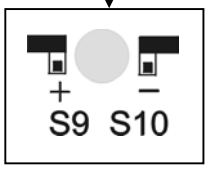
## Connect the bus cable

To be able to use segmented voltage feed and obtain redundancy in the current feed system, the bus connections should be distributed between different power supplies (see the *Calculate the power supply* chapter).




**When the jumpers are removed, the through voltage feed is cut off. The following nodes are powered by another source. The node always gets its current from the left terminal block.**

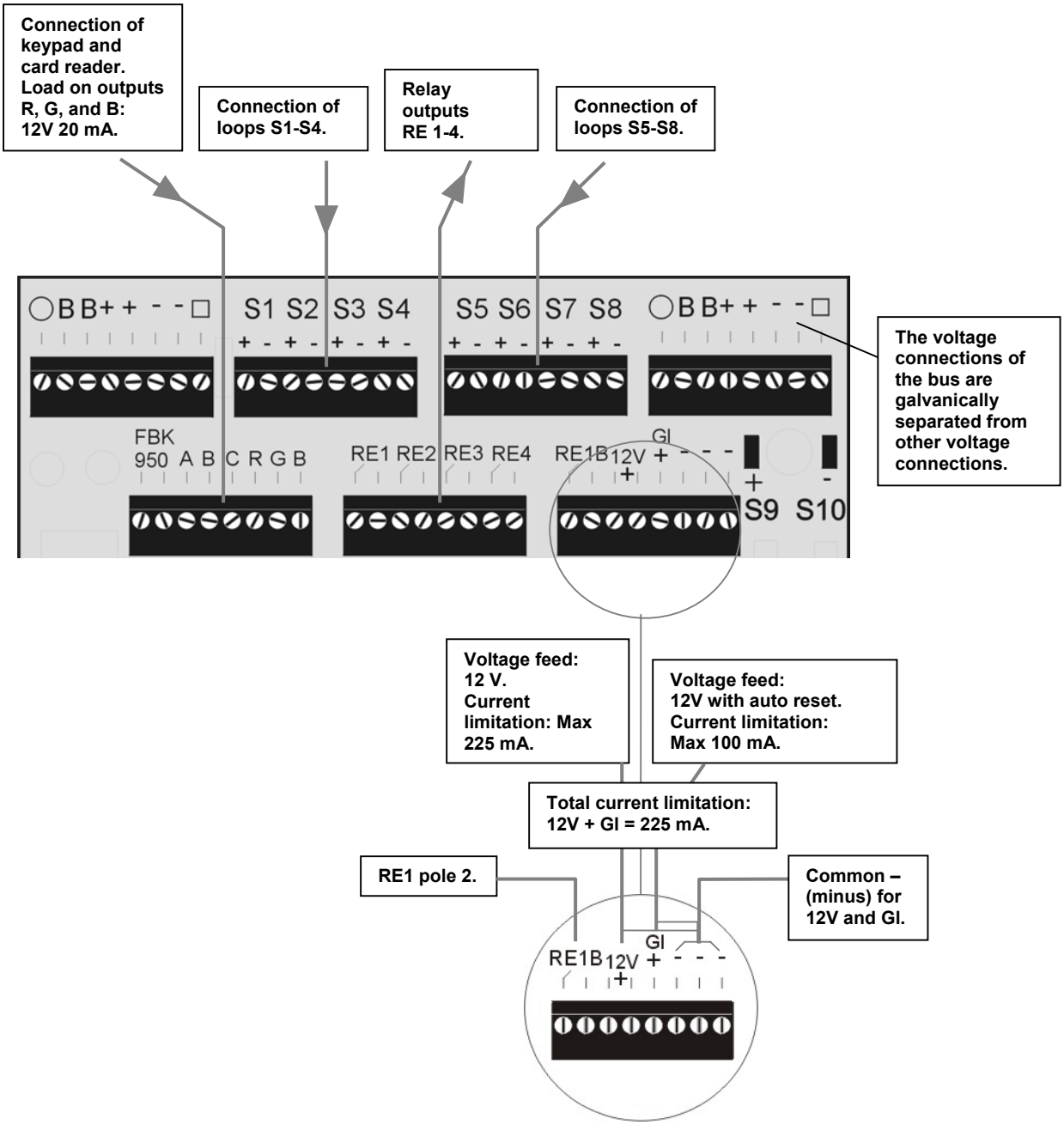
**Tip! By placing the jumpers according to the picture to the right, they are unconnected, but can be used later if you need to change the power distribution further on.**




| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
| ○ | Screen/earth connection | **R** | Indication red LED |
| **B** | Bus connection | **G** | Indication green LED |
| **+** | Positive voltage | **B** | Buzzer |
| – | Negative voltage | **GI** | Auto reset, e.g. glass breakage |
| **S 1- 4** | Loop input 1-4 | **RE 1-4** | Relay output 1-4 |
| **S 5- 8** | Loop input 5-8 | **RE1B** | Relay output 1, pole 2 |
| **FBK950** | Input keypad | □ | Free connection point |
| **A, B, C** | Input card reader | | |

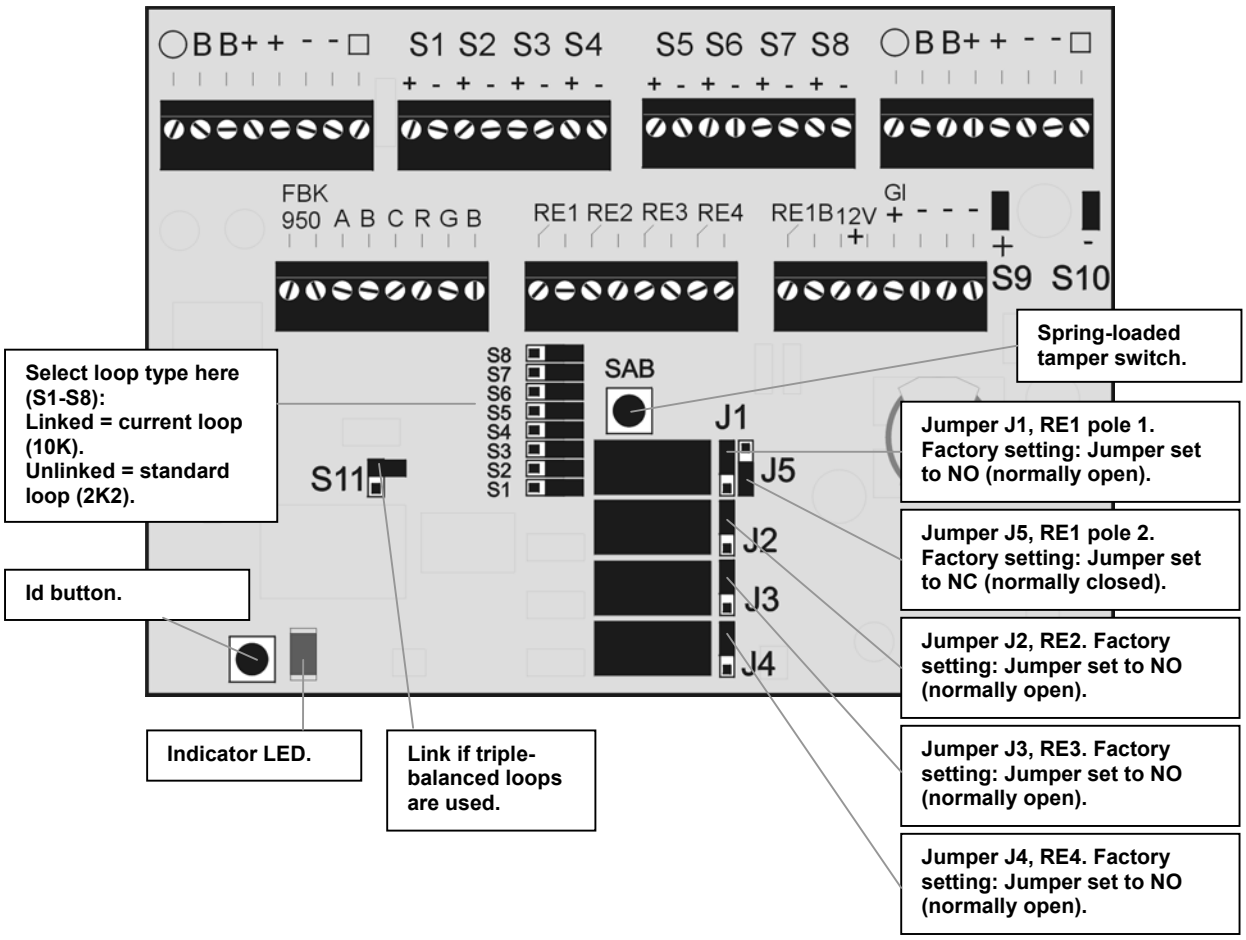
## *Other connections*

For each loop, you may select whether the loop should be a standard loop (with 2.2 K ohm balancing resistors) or a current loop (with a 10 K ohm balancing resistor). This option can save both time and money in installations where both fire alert, glass breakage alarm and conventional detector connections are used.


Connection of keypad and card reader. Load on outputs R, G, and B: 12V 20 mA.
Connection of loops S1-S4.
Relay outputs RE 1-4.
Connection of loops S5-S8.
○B B+ + - -□
S1 S2 S3 S4
S5 S6 S7 S8
○B B+ + - -□
+ - + - + - + -
FBK
950 A B C R G B
RE1 RE2 RE3 RE4
RE1B
12V +
GI
S9 S10
The voltage connections of the bus are galvanically separated from other voltage connections.
Voltage feed: 12 V. Current limitation: Max 225 mA.
Voltage feed: 12V with auto reset. Current limitation: Max 100 mA.
Total current limitation: 12V + GI = 225 mA.
RE1 pole 2.
Common – (minus) for 12V and GI.

## Switches and indicators

The following switches and indicators can be found on the E2V circuit board:


Select loop type here (S1-S8):
Linked = current loop (10K).
Unlinked = standard loop (2K2).
Id button.
Indicator LED.
Link if triple-balanced loops are used.
Spring-loaded tamper switch.
Jumper J1, RE1 pole 1. Factory setting: Jumper set to NO (normally open).
Jumper J5, RE1 pole 2. Factory setting: Jumper set to NC (normally closed).
Jumper J2, RE2. Factory setting: Jumper set to NO (normally open).
Jumper J3, RE3. Factory setting: Jumper set to NO (normally open).
Jumper J4, RE4. Factory setting: Jumper set to NO (normally open).
S1 S2 S3 S4
S5 S6 S7 S8
FBK
950 A B C R G B
RE1 RE2 RE3 RE4
RE1B 12V
GI
S9 S10
S8 S7 S6 S5 S4 S3 S2 S1
SAB
S11
J1
J5
J2
J3
J4

The tamper switch is spring-loaded, which means that it is activated when the cover is removed. On the back, a tamper plug (black rubber plug) is attached. It triggers the tamper alarm if the unit is forced off the wall.

The relays are voltage free, which means that other systems with different potential levels can be connected to the relays.

All relay outputs have jumpers. By moving the jumpers you may select if the output should be open (NO) or closed (NC) when the relay is in quiescent state, i.e. not activated. See jumpers J1- J5.

RE1 also has an extra output, the relay's pole two (RE1B). These outputs can each have different connection objects, but are commonly controlled when the RE1 relay is activated. RE1 is often used for fire door closing, where the function is common with the door's egress button (see the *Other applications* chapter, the *Fire door closing* section).

Maximum load over the relays are 30V AC/DC, 1.0 A.

## Inputs and outputs

E2V has the following inputs and outputs:

| Type | Number |
|---|---|
| Bus connection with separate output for current transit. | 1 |
| Loop inputs (double-balanced). Each loop consists of 1 input. | 8* |
| Input for connection of keypad (FBK). | 1** |
| Input for connection of card reader. | 1 |
| Input for connection of 12V voltage feed. | 1 |
| Output with auto reset, for e.g. glass breakage or smoke detectors. | 1 |
| Outputs for optical or acoustic indication. | 3 |
| Relay outputs for optional use. | 4*** |

* For each loop, you may select if the loop should be a standard loop (with 2.2 K ohm balancing resistors) or a current loop (with a 10 K ohm balancing resistor). Current loops are used e.g. for glass breakage or smoke detectors.

** ***Note!*** If you connect a card reader/keypad to the FBK input, the S8 input cannot be used and should be left unconnected. Then, in the operator's program, define the S8 input as keypad tamper. The FBK input can manage keypads with both 5 and 12 buttons and is tamper protected.

*** The function of the relay outputs can be defined freely from the operator's program (see the *Operator's Program Installation Manual*).

Each loop consists of an input which can later be defined as an input function of your own choice in the operator's program (see the *Operator's Program Installation Manual*). An input function is the function defined for the input, e.g. intruder alarm, fire alert, egress etc. If a conventional loop is changed to a current loop, smoke and glass breakage detectors with auto reset function can be connected.

## Connect alarm components, card readers, locks etc

Connection examples for connection of double- and triple-balanced loops, alarm components, card readers, keypads, sirens, electric locks etc can be found in the chapters *Alarm components*, *Keypads and card readers, Sirens* and *Electric locks and motor locks* respectively.

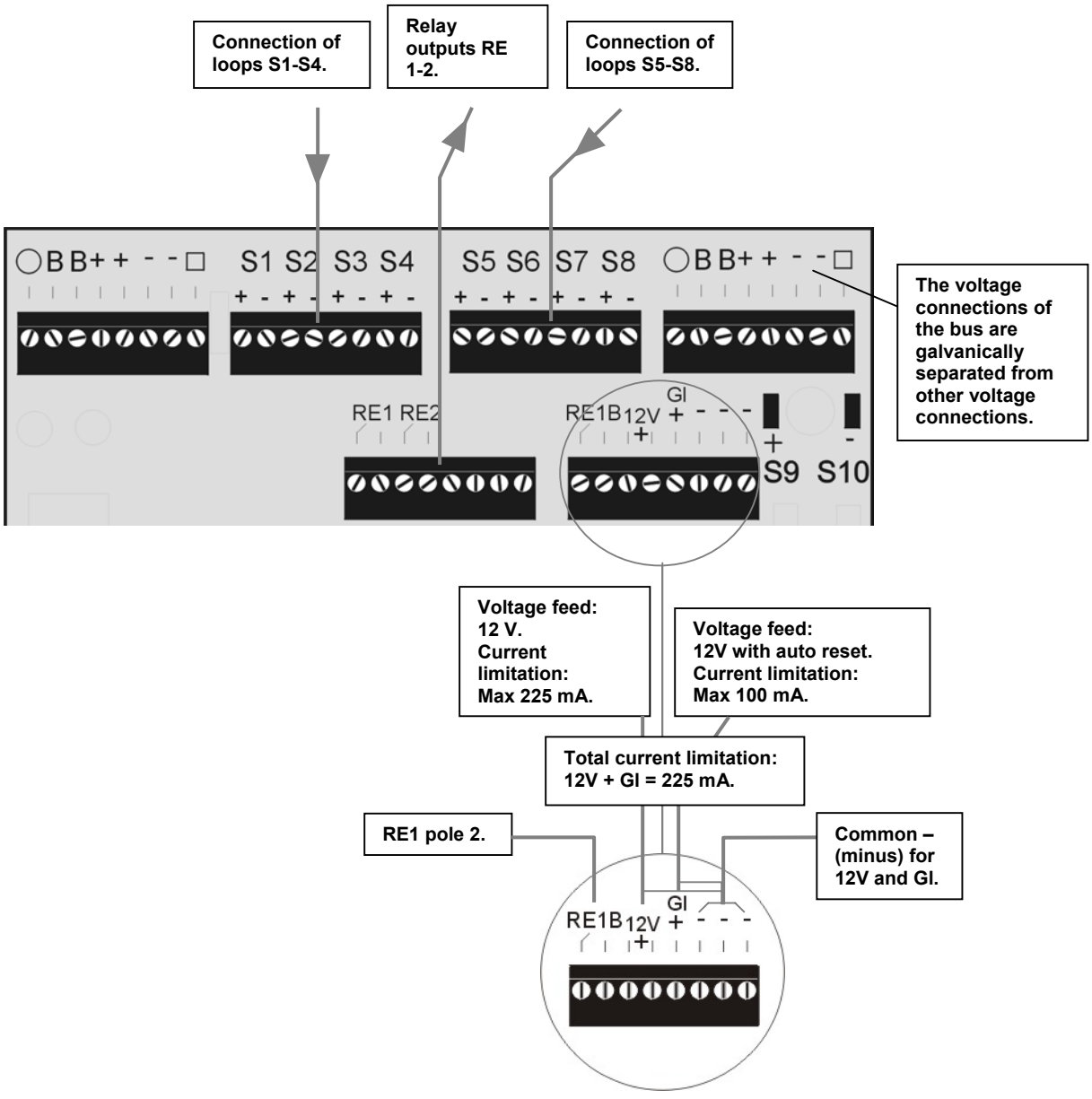
# Install the E2VL

E2VL is a node for connection of alarm components. E2VL is similar to E2V, with the exceptions that it lacks an input for card and code readers and that it only has two relay outputs.

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter. The bus cable is connected in the same way as for E2V.

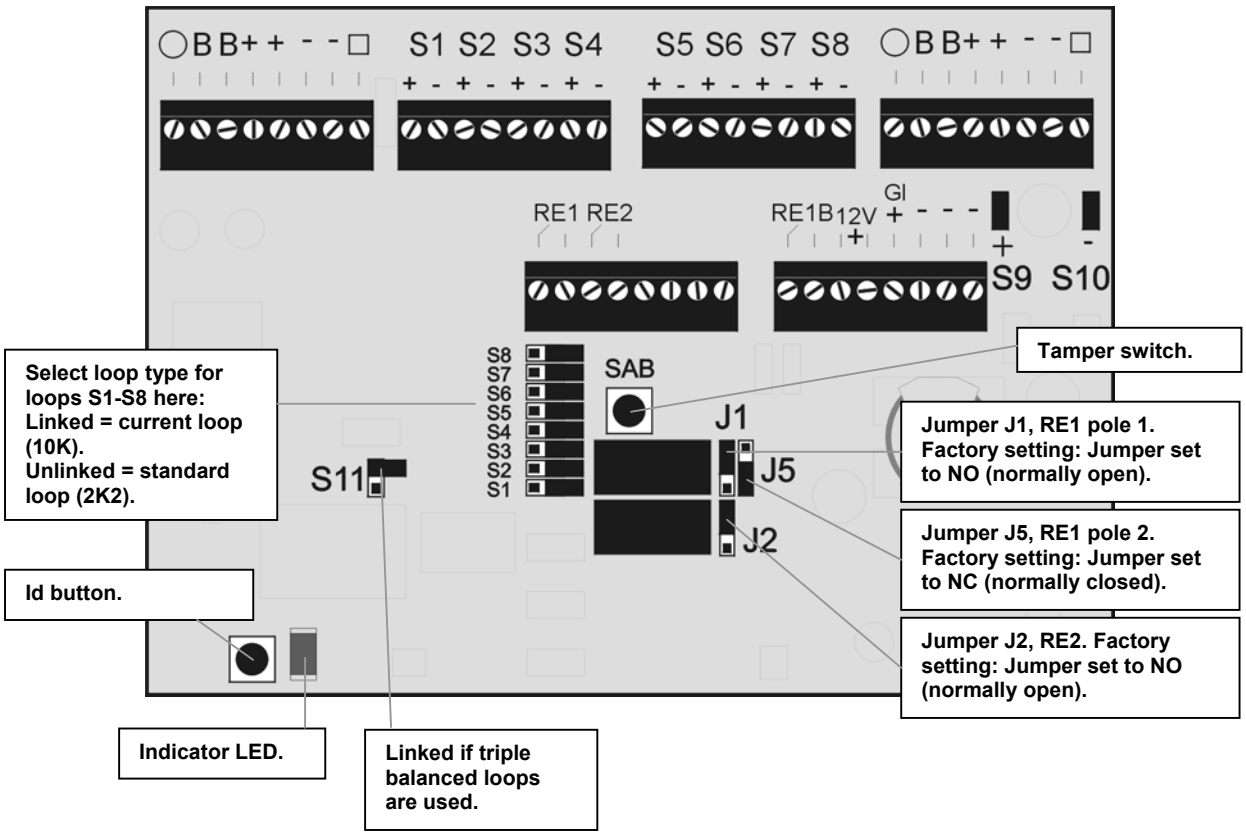
## Other connections

Like for E2V, you may select whether the loop should be a standard loop (with 2.2 K ohm balancing resistors) or a current loop (with a 10 K ohm balancing resistor). This option can save both time and money in installations where both fire alert, glass breakage alarm and conventional detector connections are used.


Connection of loops S1-S4.
Relay outputs RE 1-2.
Connection of loops S5-S8.
○B B+ + - -□ S1 S2 S3 S4
S5 S6 S7 S8 ○B B+ + - -□
RE1 RE2
RE1B 12V GI + - - -
S9 S10
The voltage connections of the bus are galvanically separated from other voltage connections.
Voltage feed: 12 V. Current limitation: Max 225 mA.
Voltage feed: 12V with auto reset. Current limitation: Max 100 mA.
Total current limitation: 12V + GI = 225 mA.
RE1 pole 2.
Common – (minus) for 12V and GI.

## *Switches and indicators*

The following switches and indicators can be found on the E2VL circuit board:


Select loop type for loops S1-S8 here: Linked = current loop (10K). Unlinked = standard loop (2K2).
Id button.
Indicator LED.
Linked if triple balanced loops are used.
Tamper switch.
Jumper J1, RE1 pole 1. Factory setting: Jumper set to NO (normally open).
Jumper J5, RE1 pole 2. Factory setting: Jumper set to NC (normally closed).
Jumper J2, RE2. Factory setting: Jumper set to NO (normally open).
S1 S2 S3 S4
S5 S6 S7 S8
RE1 RE2
RE1B
12V
GI
S9 S10
S8 S7 S6 S5 S4 S3 S2 S1
SAB
S11
J1
J5
J2

The tamper switch is spring-loaded, which means that it is activated when the cover is removed. On the back, a tamper plug (black rubber plug) is attached. It triggers the tamper alarm if the unit is forced off the wall.

Both relay outputs have jumpers. By moving the jumpers you may select whether the output should be open (NO) or closed (NC) when the relay is in quiescent state, i.e. not activated. See jumpers J1, J2 and J5.

RE1 also has an extra output, the relay's pole two (RE1B). These outputs can each have different connection objects, but are commonly controlled when the RE1 relay is activated. RE1 is most often used for fire door closing, where the function is common with the door's egress button (see the *Other applications* chapter, the *Fire door closing* section).

Maximum load over the relays are 30V AC/DC, 1.0 A.

## Inputs and outputs

The E2VL has the following inputs and outputs:

| Type | Number |
|---|---|
| Bus connection with a separate output for current transit. | 1 |
| Loop inputs (double-balanced). Each loop consists of 1 input. | 8* |
| Input for connection of 12V voltage feed. | 1 |
| Output with auto reset for e.g. glass breakage or smoke detectors. | 1 |
| Relay outputs for optional use. | 2** |

* For each loop, you may select if the loop should be a standard loop (with 2.2 K ohm balancing resistors) or a current loop (with a 10 K ohm balancing resistor). Current loops are used e.g. for glass breakage or smoke detectors.

** The function of the relay outputs can be defined freely from the operator's program (see the *Operator's Program Installation Manual*).

## Connect alarm components, sirens etc

Connection examples for connection of alarm components, sirens, electric locks etc can be found in the chapters *Alarm components*, *Sirens* and *Electric locks and motor locks* respectively. Card readers and keypads cannot be connected to E2VL.

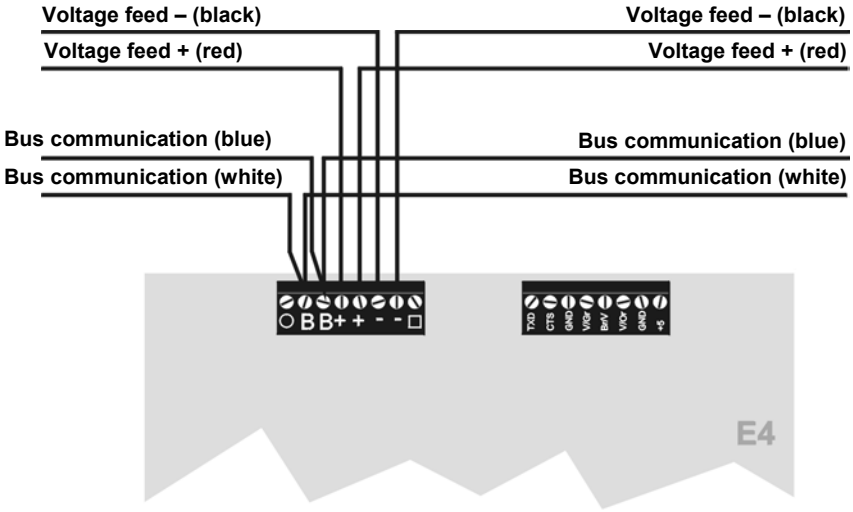
# Install the E4

The E4 is the system's control panel. By logging in to the E4, security personnel, site managers and other personnel requiring quick information from the system can view events, current status in alarm areas, silence sirens etc.

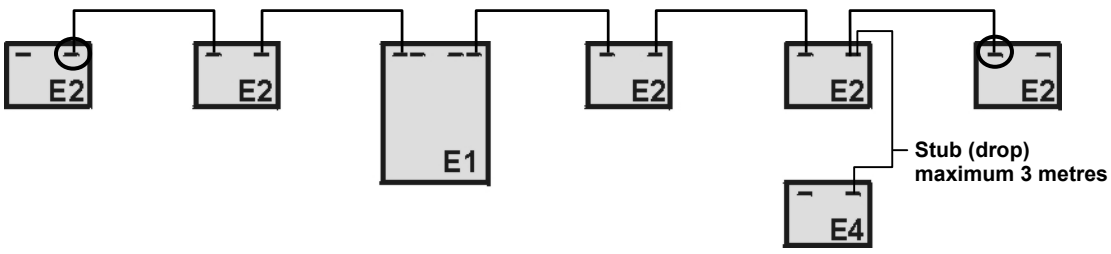
How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter.

## Connection to the bus

Connect ingoing and outgoing bus connections in parallel. Connect the voltage feed to separate connections.




If the distance to the bus is shorter than 3 metres, you can connect the E4 as a "drop" to the main bus. In this case, **one** cable is sufficient to connect the E4 (see the picture below).



## Open the unit

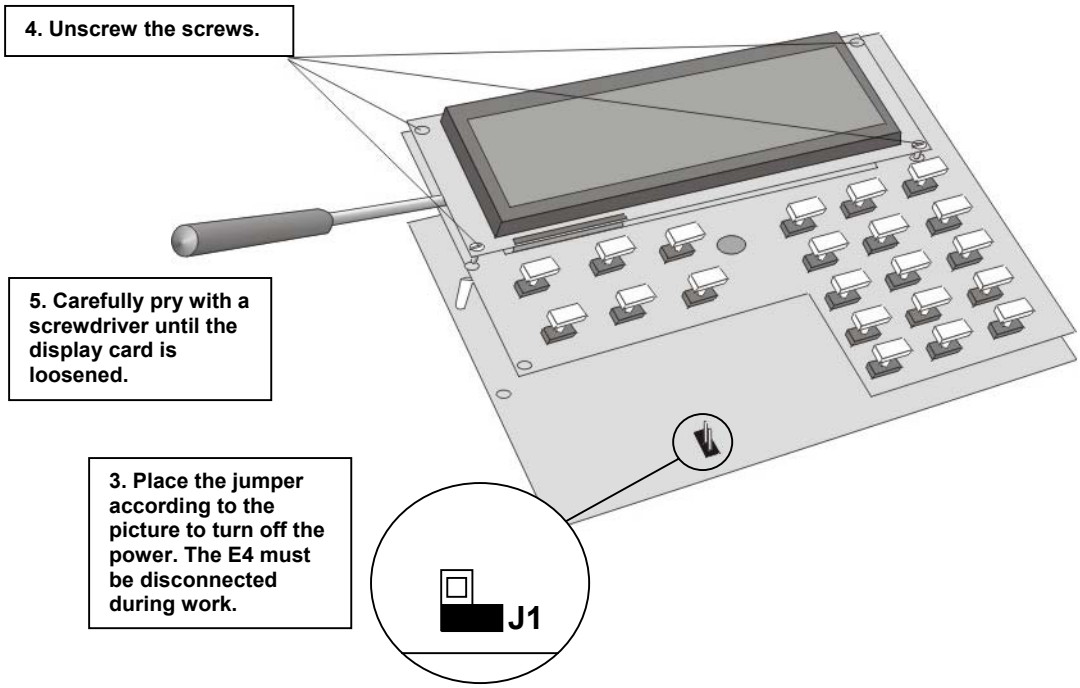
1 Unscrew the top and bottom screws. Then carefully remove the cover.

2 Mount the unit on a flat surface.

3 Disconnect the power to the E4 by removing jumper J1 (see picture below). The E4 must be disconnected during work.

4 Unscrew the screws. The upper pair is fastened with nuts under the card.

5 Carefully pry with a screwdriver until the display card is loosened from the contact rail. As you put back the display card, check that all contact pins fit in the contact rail on the middle card.

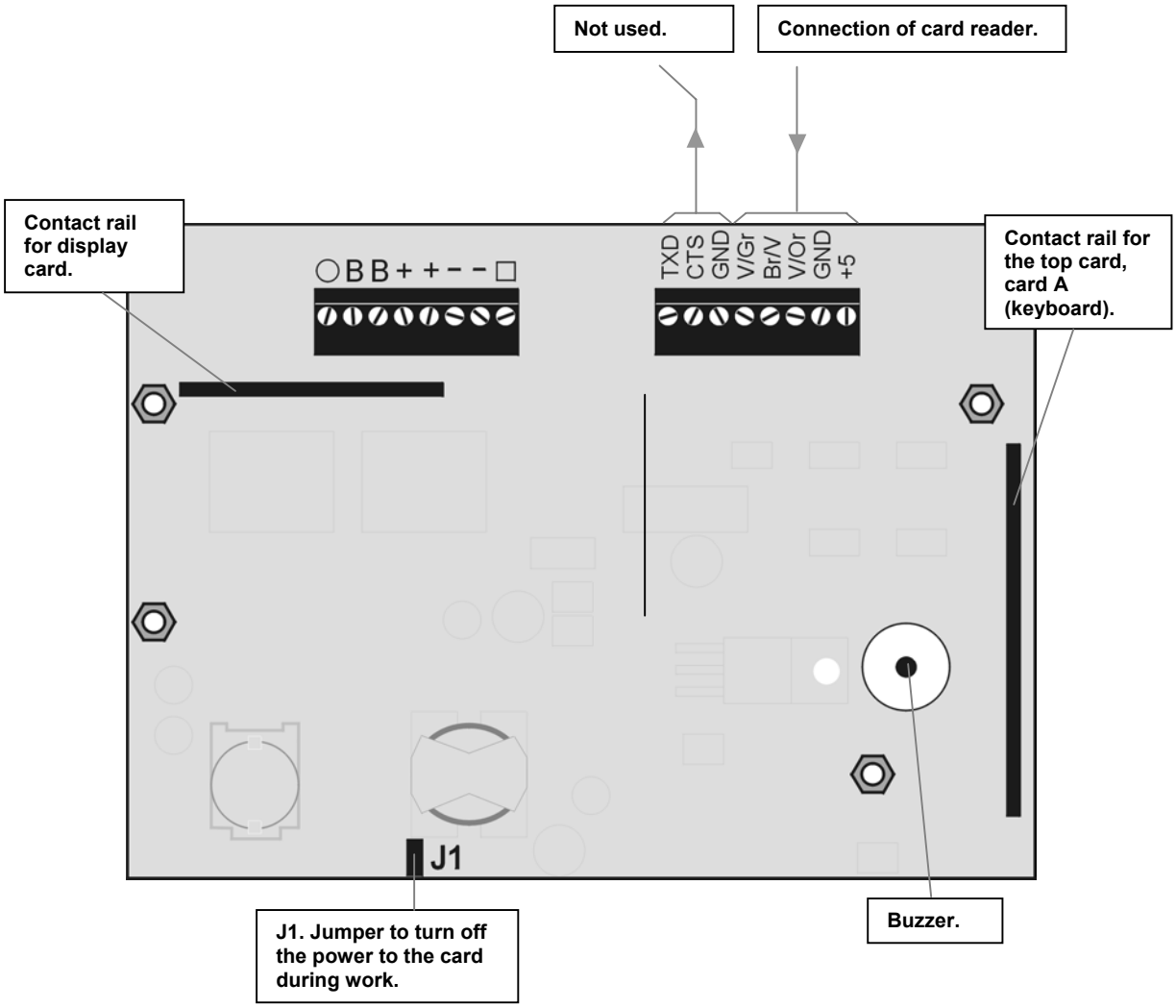

4. Unscrew the screws.
5. Carefully pry with a screwdriver until the display card is loosened.
3. Place the jumper according to the picture to turn off the power. The E4 must be disconnected during work.
J1

## *Two circuit boards and one display card*

The E4 contains two circuit boards (card A and card B) and a display card. The contact rails (see picture below) connects the top card, card A, with the ”mother card”, card B. If you you are going to work with the cards, first remove the jumper J1 to turn off the power to the E4.

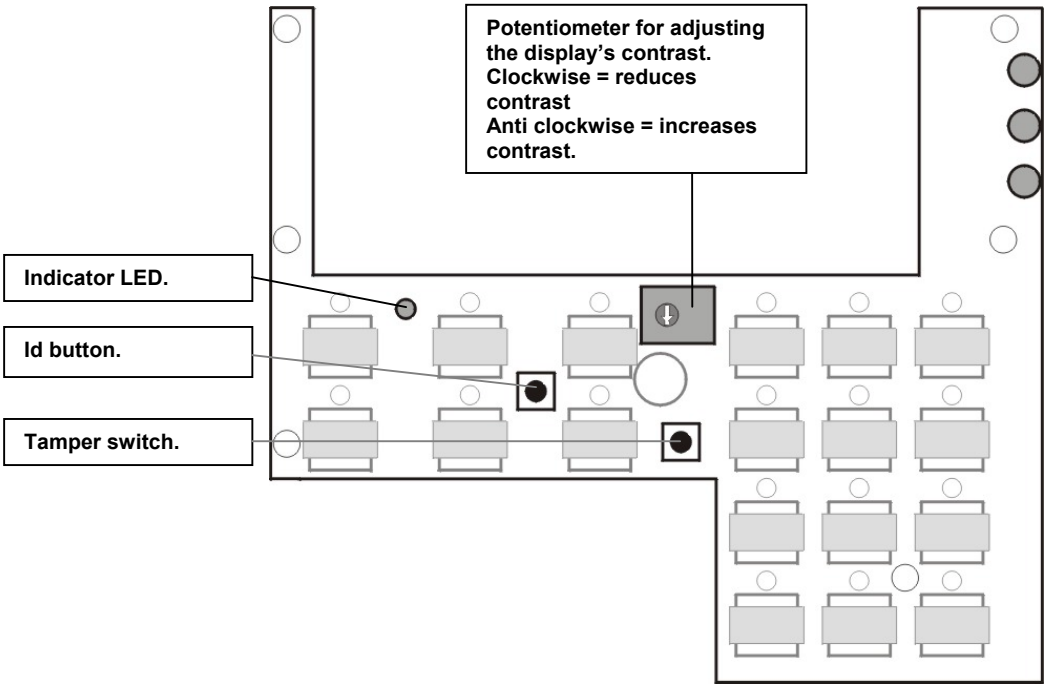
| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
| ○ | Screen/earth connection | **GND** | Ground |
| **B** | Bus connection | **V/Gr** | Connection of card reader |
| **+** | Positive voltage | **Br/V** | Connection of card reader |
| – | Negative voltage | **V/Or** | Connection of card reader |
| **TXD** | Not used | **GND** | Ground |
| **CTS** | Not used | **+5V** | Card reader voltage feed |

## *Card B*



## Card A

The indicator LED (see picture below) is lit when the ID button is pressed. The card also includes a tamper switch. Above the tamper switch, a potentiometer for adjusting the display's contrast is attached. The contrast is preset and need not normally be adjusted.


Potentiometer for adjusting the display's contrast. Clockwise = reduces contrast Anti clockwise = increases contrast.
Indicator LED.
Id button.
Tamper switch.

## The display card

To be able to reach the terminal blocks, you have to remove the display card. Be careful not to damage the card or the display. The display includes two 16-character rows and has background lighting.

## *Inputs and outputs*

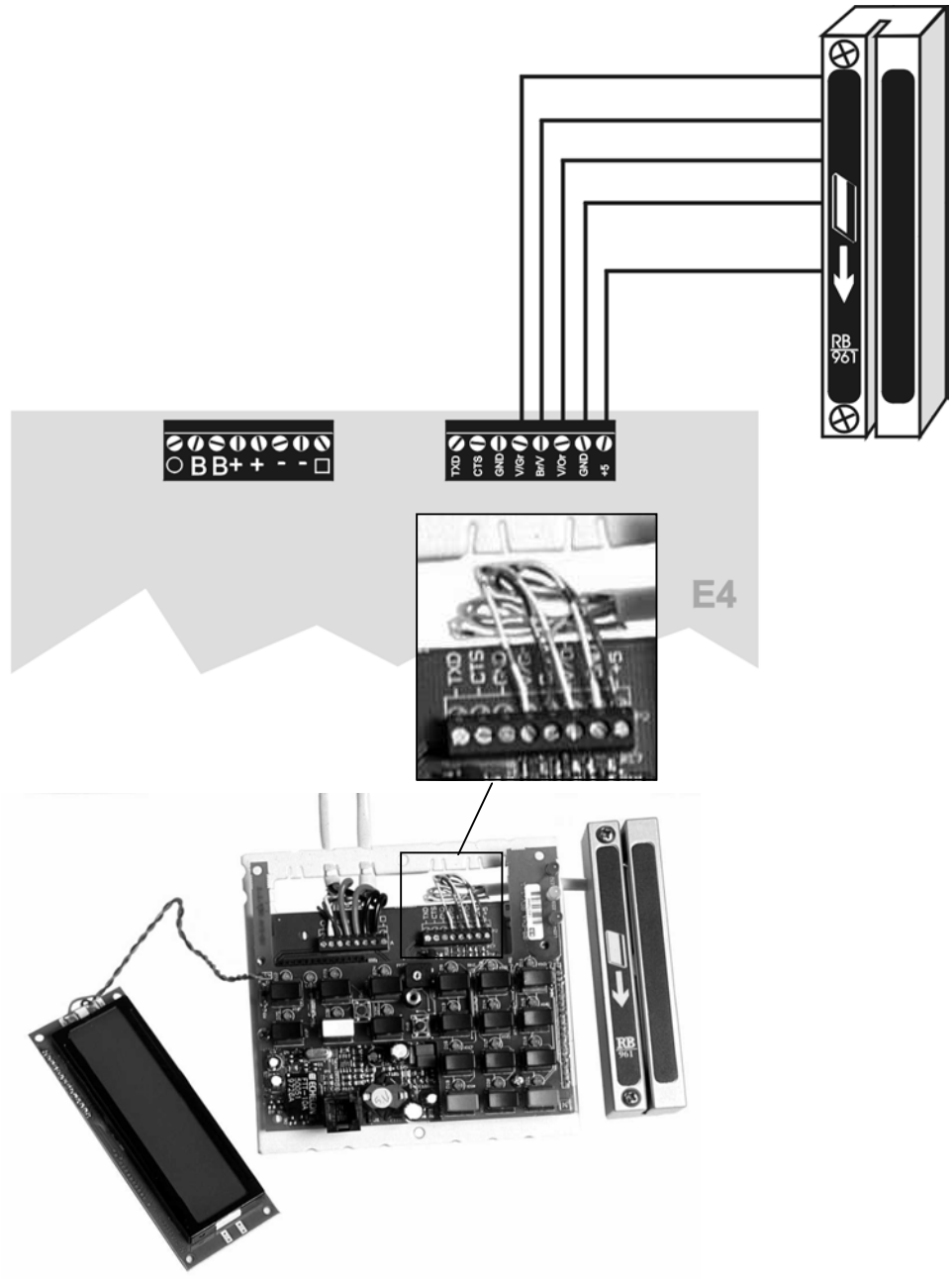
The E4 has the following inputs and outputs:

| Type | Number |
|---|---|
| Bus connection | 1 |
| Input for card reader, e.g. RB961 or PR500 | 1 |
| Red, yellow and green LED (for optional use) | 3 |
| Buzzer (for optional use) | 1 |

## Connect the RB961 card reader

To be able to access the menus in the E4, the guard or site manager has to log in using a code on the E4 keypad. If the customer has a card-based access control system, it is simpler for the user if he/she can access the functions by swiping a card. By connecting the RB961 card reader to the E4, the user can also perform operations (e.g. setting the alarm) using the card or card + code.

RB961 is exclusively designed for connection to the E4 and is mounted on the right side of the E4. The cable is 30 cm and fixed in the card reader. The card reader uses the E4's LEDs and buzzer.

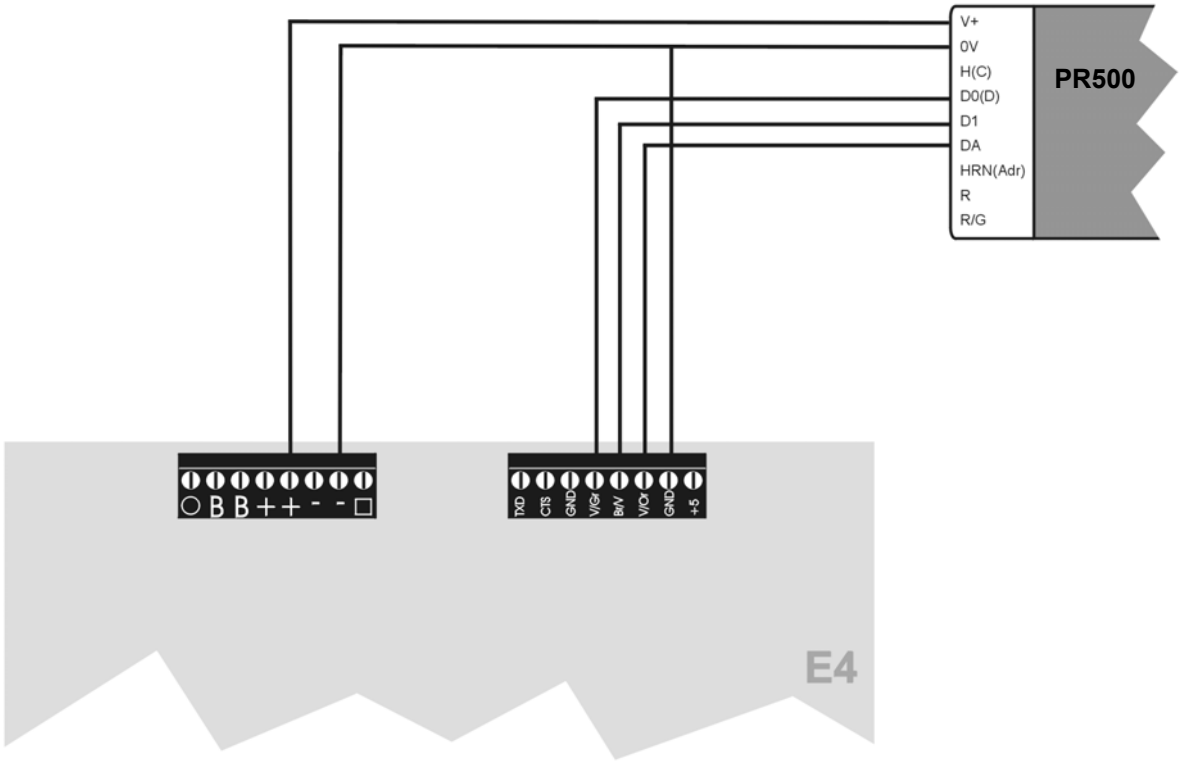


## *Connect the PR500 proximity reader*

If needed, the PR500 proximity card reader can be connected to the E4 unit, instead of a conventional card reader. The PR500 reader is compatible with both active and passive Bewator cards and tags.

The PR500 proximity reader reads cards or tags without them being in contact with the reader.

The reader continuously transmits a low-power radio frequency. When a card or tag is presented within the field of the reader it activates and transmits a unique identification number back to the reader. The reader then sends this code to the connected control unit in Bewator 2010.



# Install the E4B

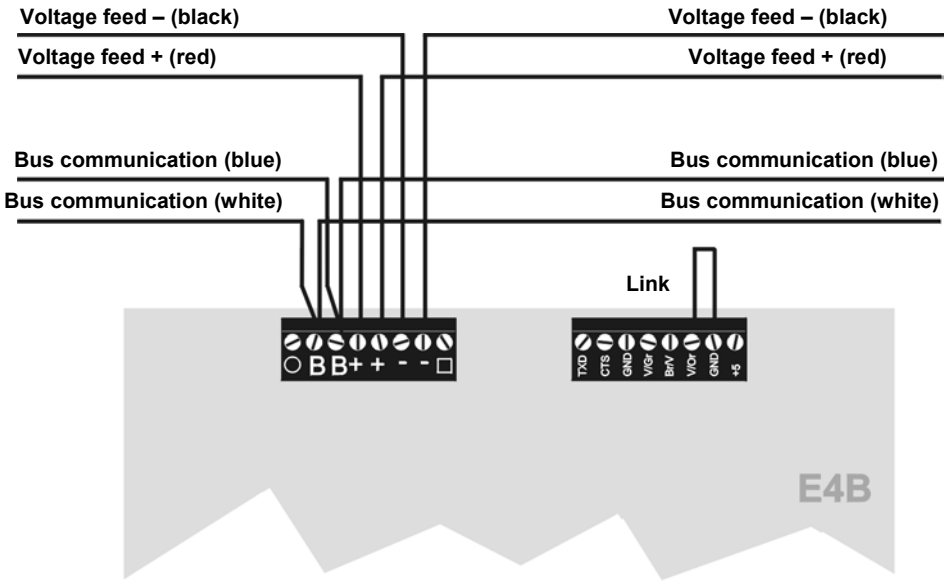
The E4B is a control panel designed for fire personnel and other persons authorized to read events and act on fire and evacuation alarms.

The difference between the E4 and the E4B is that the E4B must be controllable by external people (i.e. fire personnel). E4B has a limited number of buttons whose function is clearly indicated with text on the control panel.

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter. For other mounting instructions, see E4.

The table below explains the circuit board's inputs and how they are used:

| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
| ○ | Screen/earth connection | **GND** | Not used |
| **B** | Bus connection | **V/Gr** | Not used |
| **+** | Positive voltage | **Br/V** | Not used |
| – | Negative voltage | **V/Or** | Link to GND |
| **TXD** | Not used | **GND** | Link to V/Or |
| **CTS** | Not used | **+5V** | Not used |



# *Install the E5*

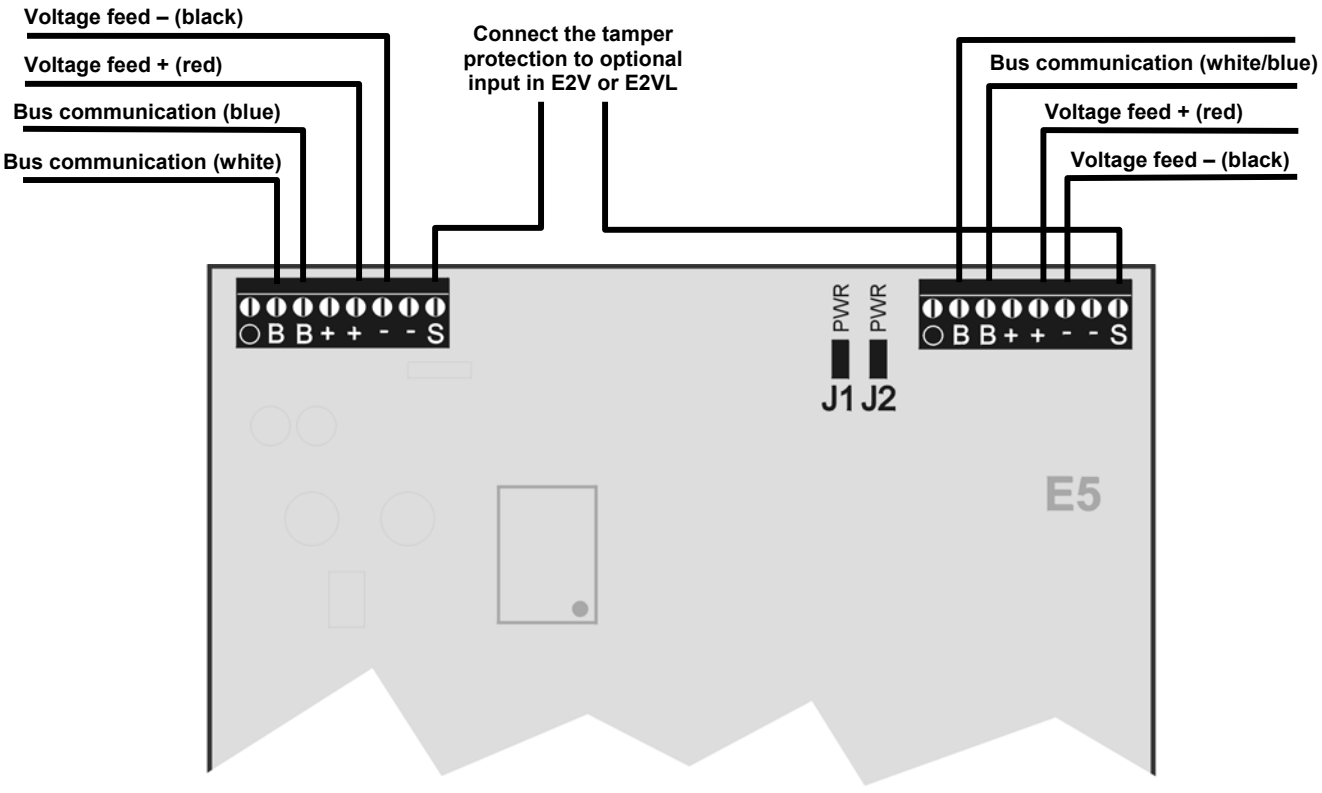
If the bus cable contains many branches, or if more than 40 nodes are connected on the bus, an E5 repeater should be connected to divide the bus into different cable segments. If there is a short-circuit or interruption in one cable segment, the rest of the cable segments will still be working fine. If the number of nodes exceeds 60, it is a requirement that the E5 repeater is connected.

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter.

> ***Note!*** The E5 does not contain a neuron and is not installed in the operator's program.

## *Bus connection*

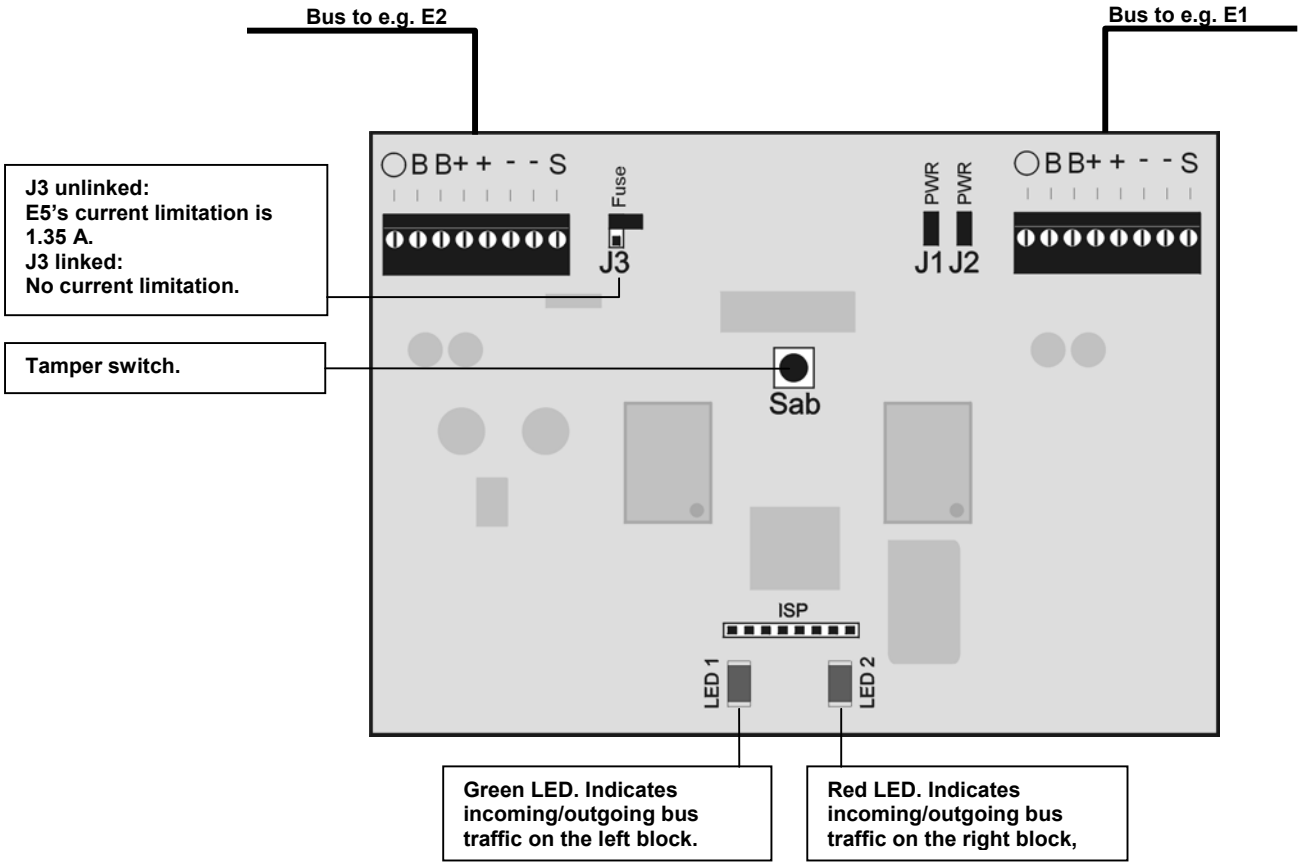
Connect the bus to the left and right bus connections as illustrated below



## Switches and indicators

The following switches and indicators are found on the E5 circuit board.

| Symbol | Explanation |
|---|---|
| ○ | Screen/earth connection |
| **B** | Bus connection |
| **+** | Positive voltage |
| – | Negative voltage |
| **S** | Tamper protection |

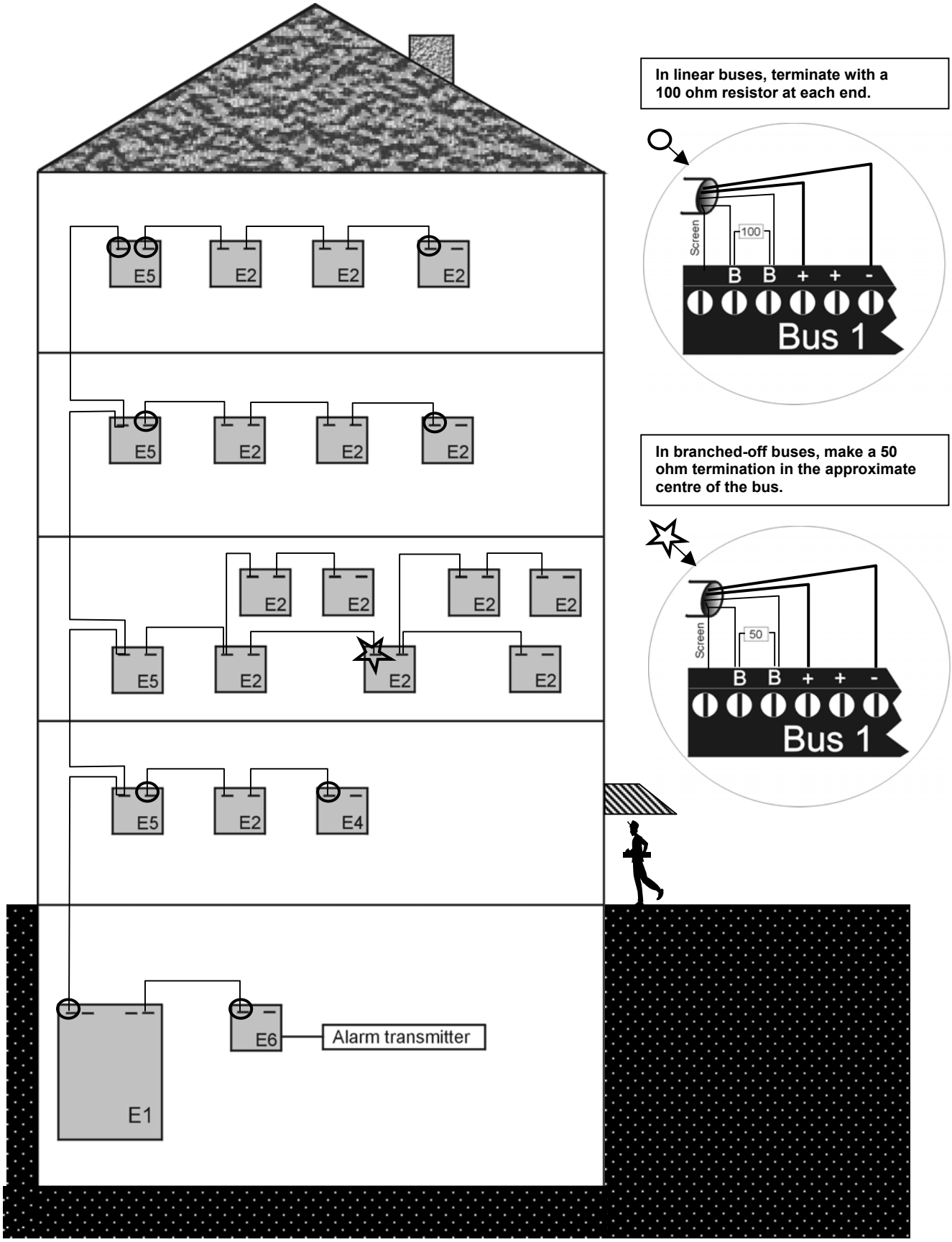



## Inputs and outputs

E5 has the following inputs and outputs:

| Type | Number |
|---|---|
| Bus connection with separate output for current transit. | 1 |

## *Connection example*



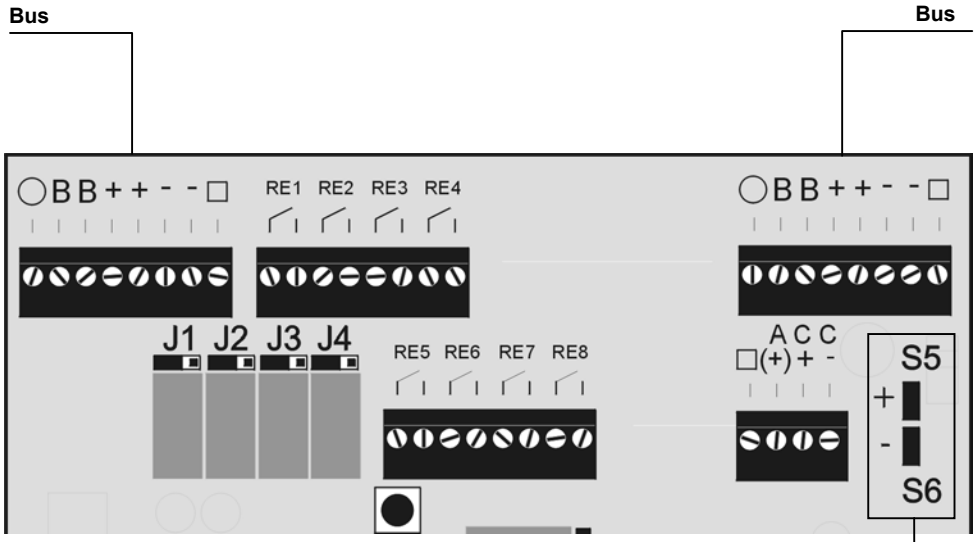
# Install the E6

Using an E6, up to 8 optional functions can be controlled via voltage free relay outputs. In the operator's program, each relay output can be allocated different control functions, e.g. for alarm outputs, lifts, lighting etc.

How the unit is mounted is described in the *Mounting – general description* section in the beginning of this chapter.

## Connect the bus cable

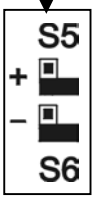
To be able to use segmented voltage feed and obtain redundancy in the current feed system, the bus connections should be distributed between different power supplies (see the *Calculate the power supply* chapter).




**When the jumpers are removed, the trough voltage feed is cut off. The following nodes are powered by a different source. The node always gets its current from the left terminal block.**

**Tip! By placing the jumpers according to the picture to the right, they are unconnected but can be used later if you need to change the power distribution further on.**

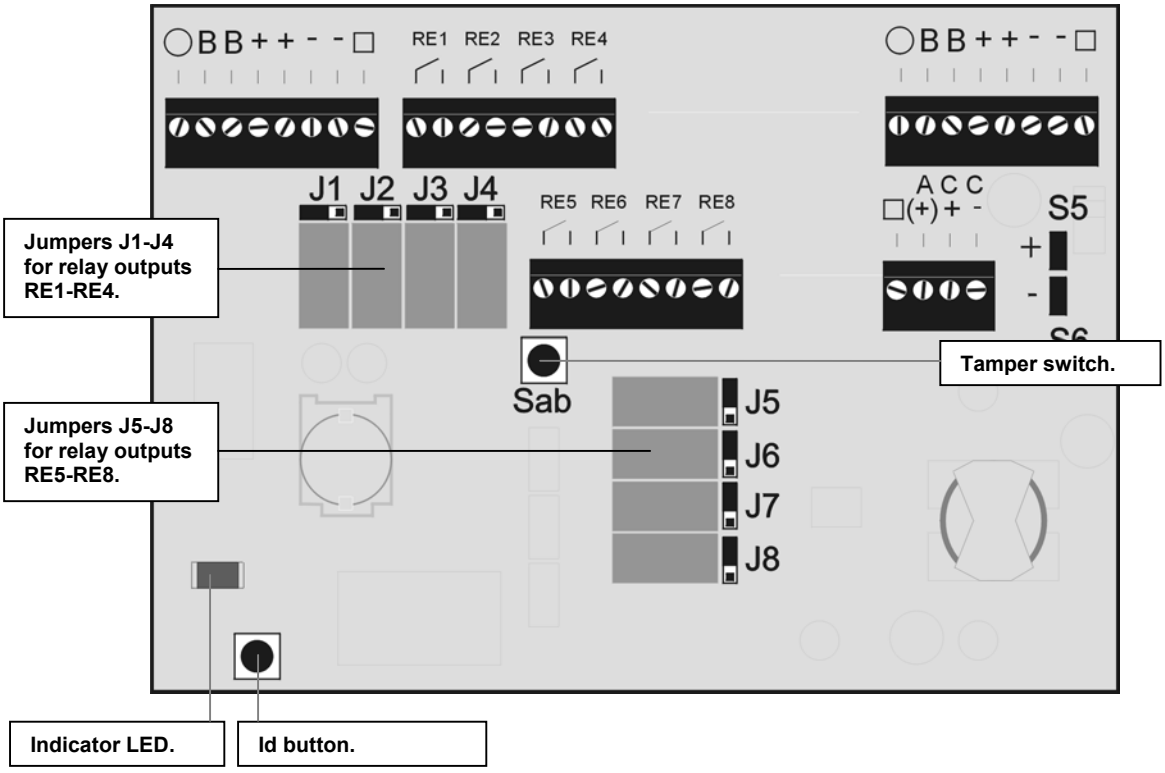
**Also see the *Calculate power supply* chapter.**




| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
| ○ | Screen/earth connection | **RE1 RE8** | Relay outputs 1-8 |
| **B** | Bus connection | **ACC (+)** | Voltage feed 12V |
| **+** | Positive voltage | **ACC** – | –12 V |
| – | Negative voltage | **ACC +** | Not used |
| □ | Free connection point | | |

## *Switches and indicators*

For each relay, there is a separate jumper to switch the relay from normally open (the factory setting) to normally closed, when the relay is not activated. This gives the possibility to control reserve functions, if the voltage or communication should disappear. It also helps to minimize the node's power consumption.



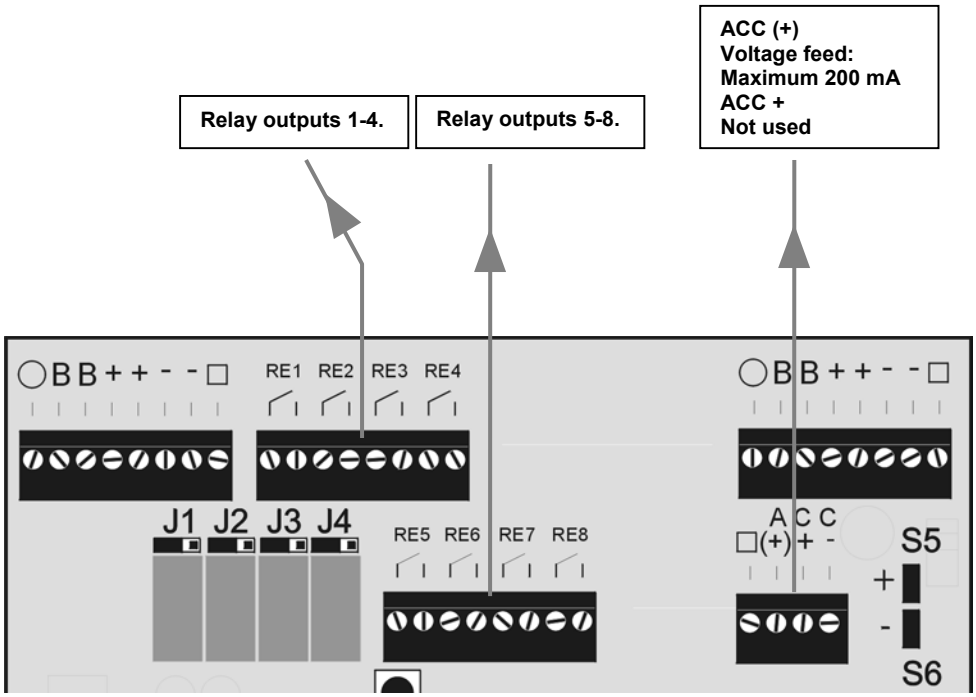

Maximum load over the relay contacts is 30 VAC/DC, 1A.

## Inputs and outputs

The E6 has the following inputs and outputs:

| Type | Number |
|---|---|
| Bus connection with a separate output for current transit | 1 |
| Relay outputs | 8 |
| Charging output for battery | 1 |

All relay outputs are voltage free. Using jumpers, each output can be switched between normally closed and normally open. The unit can handle a voltage feed of 200mA and has automatic current limitation.




## Connect components for control

Via the operator's program, all relays can be defined for optional control functions, e.g. alarm transmitters, lighting, sirens, high-voltage applications (e.g. lifts), indications etc. In the chapters *Alarm transmitter, Sirens, Electric locks and motor locks* and *Other applications* you will find connection examples for some of these application areas.

Connect to
**E2V**

# Keypads and card readers

## Connect RB9160 and RB9160 prox

RB9160 is a keypad with a built-in card reader. It is primarily designed for alarm control and access control. It is also available as a proximity reader (RB9160 prox). RB9160 is very well housed and does not normally require extra heating on outdoor installations. In exposed places, we recommend that the unit is installed under a weatherproof hood (accessory).

### Mount the reader

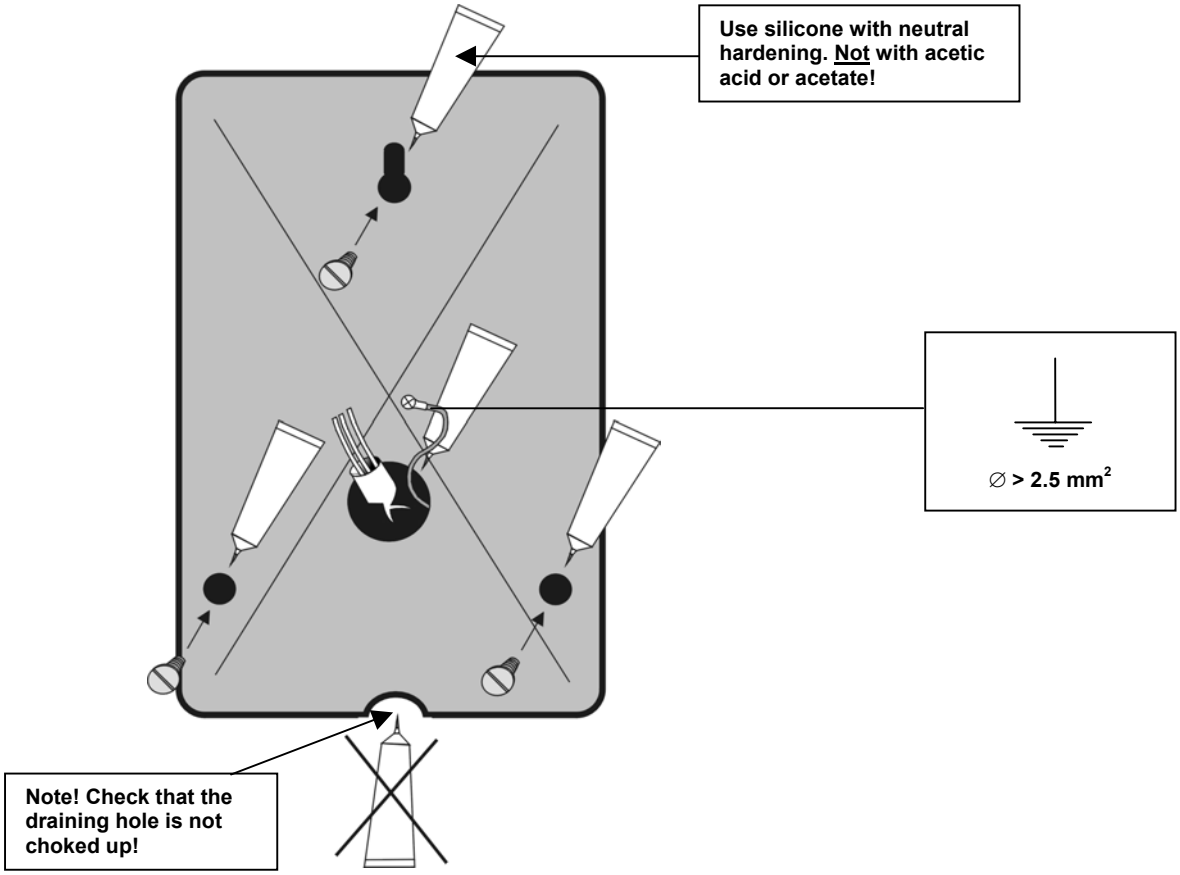
1 Use a knife and make a cut for the connection cable in the reader's cable entry hole.

2 Pull the cable from the E2V unit through the cable entry hole.

3 Fasten the back plate against a flat surface, using three screws.

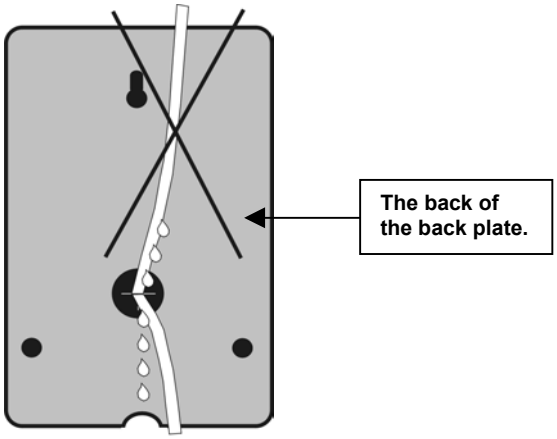
4 Seal the screw holes and the cable entry hole with silicone.

5 Check that the tamper plug is in place (black rubber plug on the back).


Use silicone with neutral hardening. Not with acetic acid or acetate!
∅ > 2.5 mm²
Note! Check that the draining hole is not choked up!

## How to avoid leakage

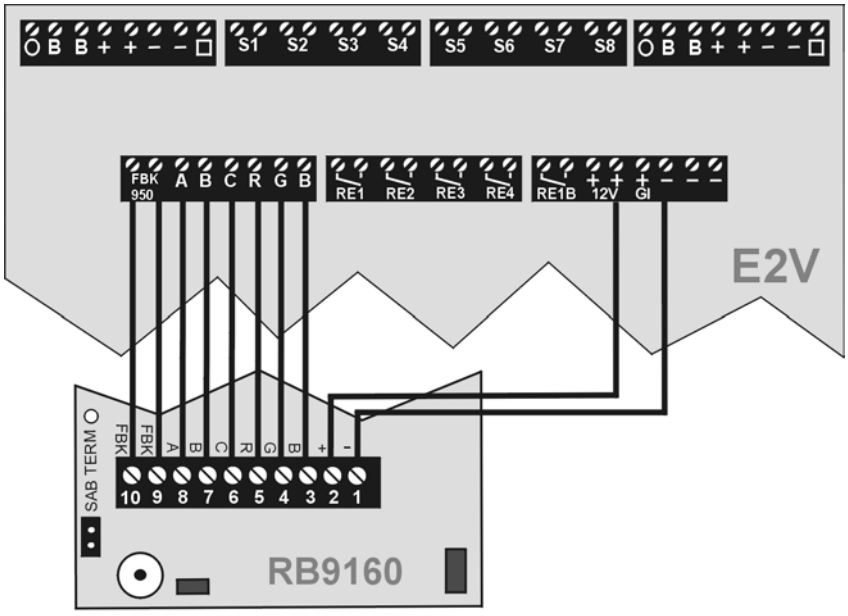
The best way to prevent water from leaking in to the reader along the connection cable is to lay the cable downwards according the illustration below:




## Connect the reader

The keypad uses one of the terminal blocks to connect to E2V. The total cable length to an E2V must not exceed 25 m. Bewator recommends that the node is mounted near the reader and that the EKKX 6x2x0.5 connecting cable is used. On outdoor installations, attach a weatherproof hood to the RB9160.

**Note!** When a keypad is connected to E2V, leave input S8 in E2V unconnected.



Connect to
**E2V**

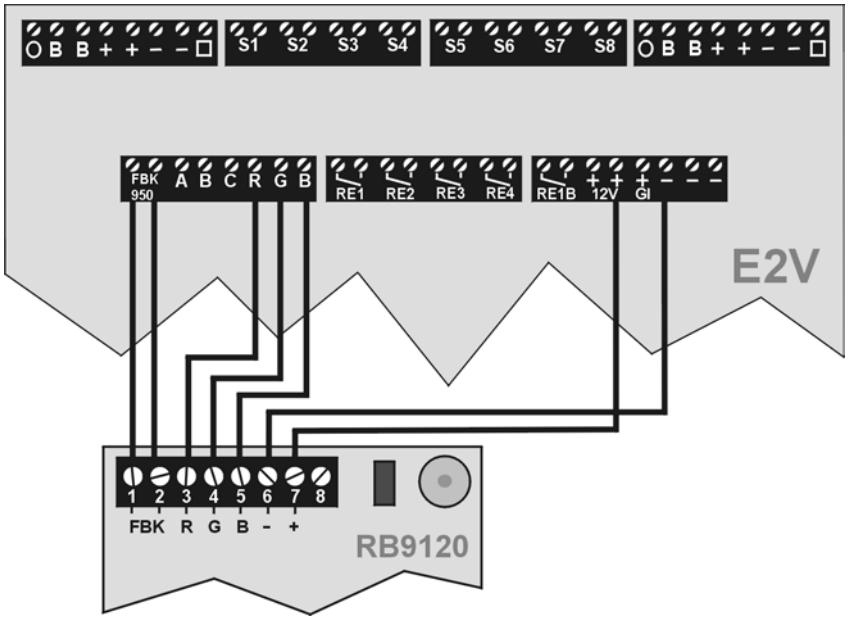
# *Connect RB9120*

RB9120 is a keypad used for access control and to perform operations (e.g. setting the alarm). It is well housed and suitable for both indoor and outdoor installations. For mounting instructions, see RB9160.

The housing consists of a cast metal cover and a back plate. The cover is fitted with a lock (two keys supplied). RB9120 does not normally require extra heating on outdoor installations. In exposed places, we recommend that the unit is installed under a weatherproof hood (accessory).

The keypad uses one of the terminal blocks to connect to E2V. The total cable length to an E2V must not exceed 25 m. Bewator recommends that the node is placed near the keypad. In outdoor installations, attach a weatherproof hood to the RB9120.

**Note!** When a keypad is connected to E2V, leave input S8 in E2V unconnected.



Connect to
**E2V**

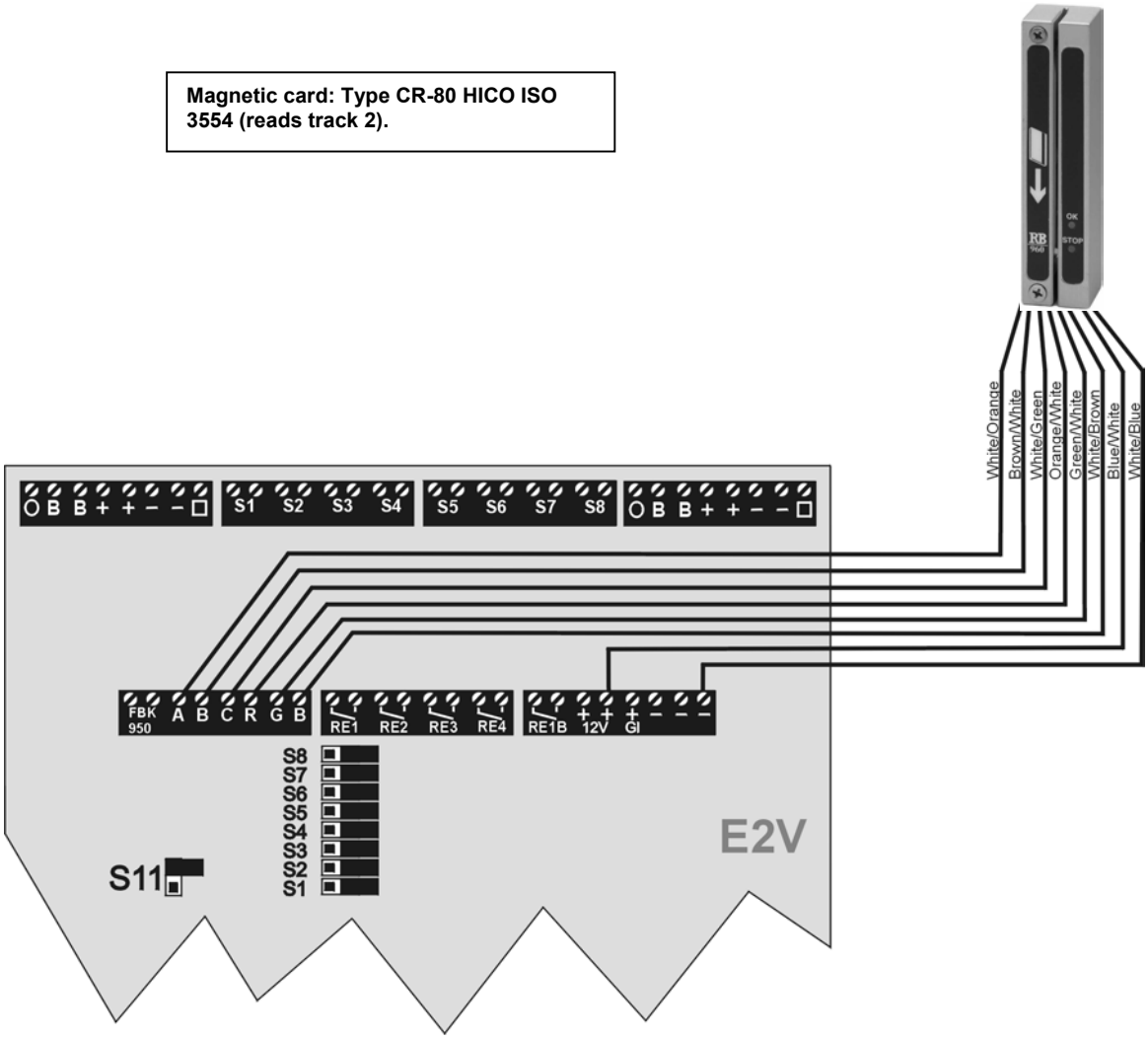
# Connect RB960

The RB960 magnetic card reader has a 7-metre fixed connection cable connectable to E2V. The card reader is primarily designed for access control, but can also be used to perform operations (e.g. setting the alarm).

By extending the card reader cable using a joint box, a total cable length of maximum 25 m is possible. Bewator recommends that E2V is placed near the card reader.

RB960 should not be installed outdoors.

**Magnetic card: Type CR-80 HICO ISO 3554 (reads track 2).**



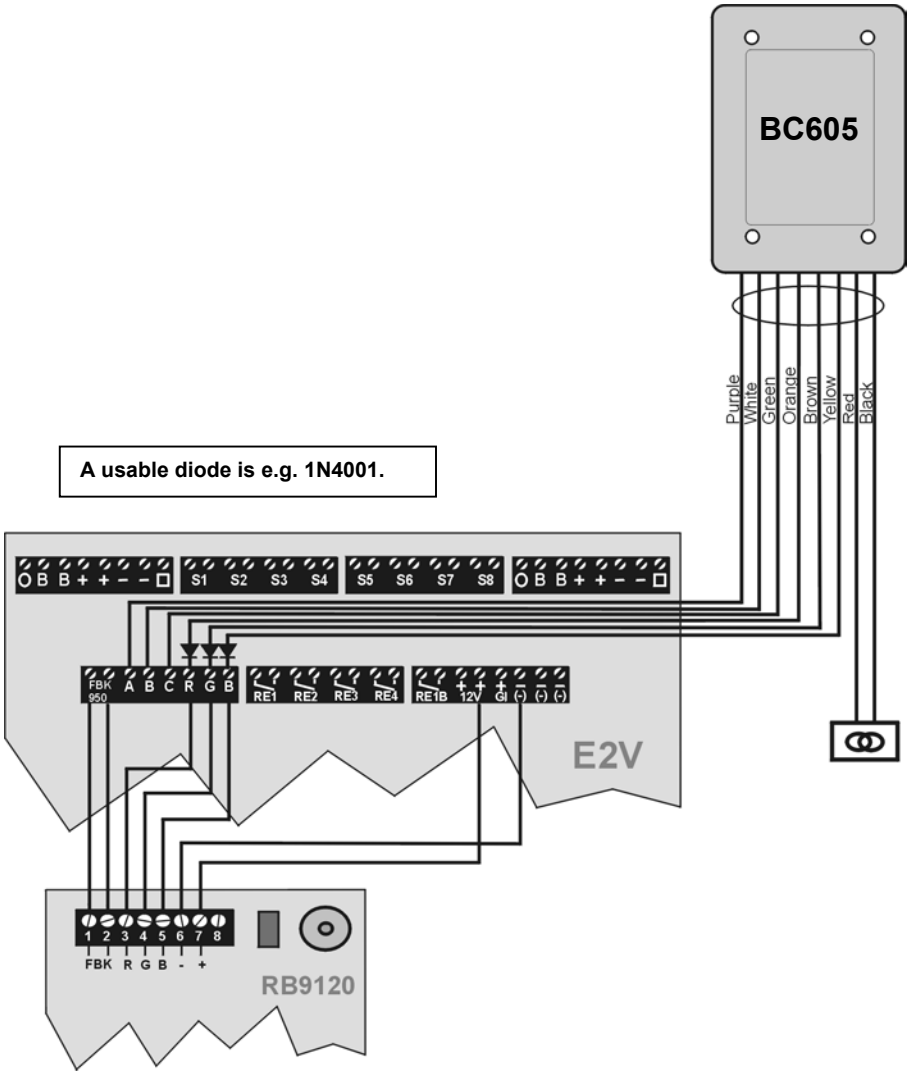
Connect to
**E2V**

# *Connect BC605*

To simplify entrance, proximity card readers can be connected. BC605 is a so called vandal-proof card reader, which means that it is extremely suitable in exposed locations. An active field around the card reader reads the entrance cards when the card holder waves the card in front of the reader.

A proximity reader must be configured, which is done by holding a configuration card in front of the reader when powered.

Readers corresponding to the ISO 7811/2-standard can be connected to E2V units. The connection example below shows how BC605 and the RB9120 card reader are connected to an E2V node.



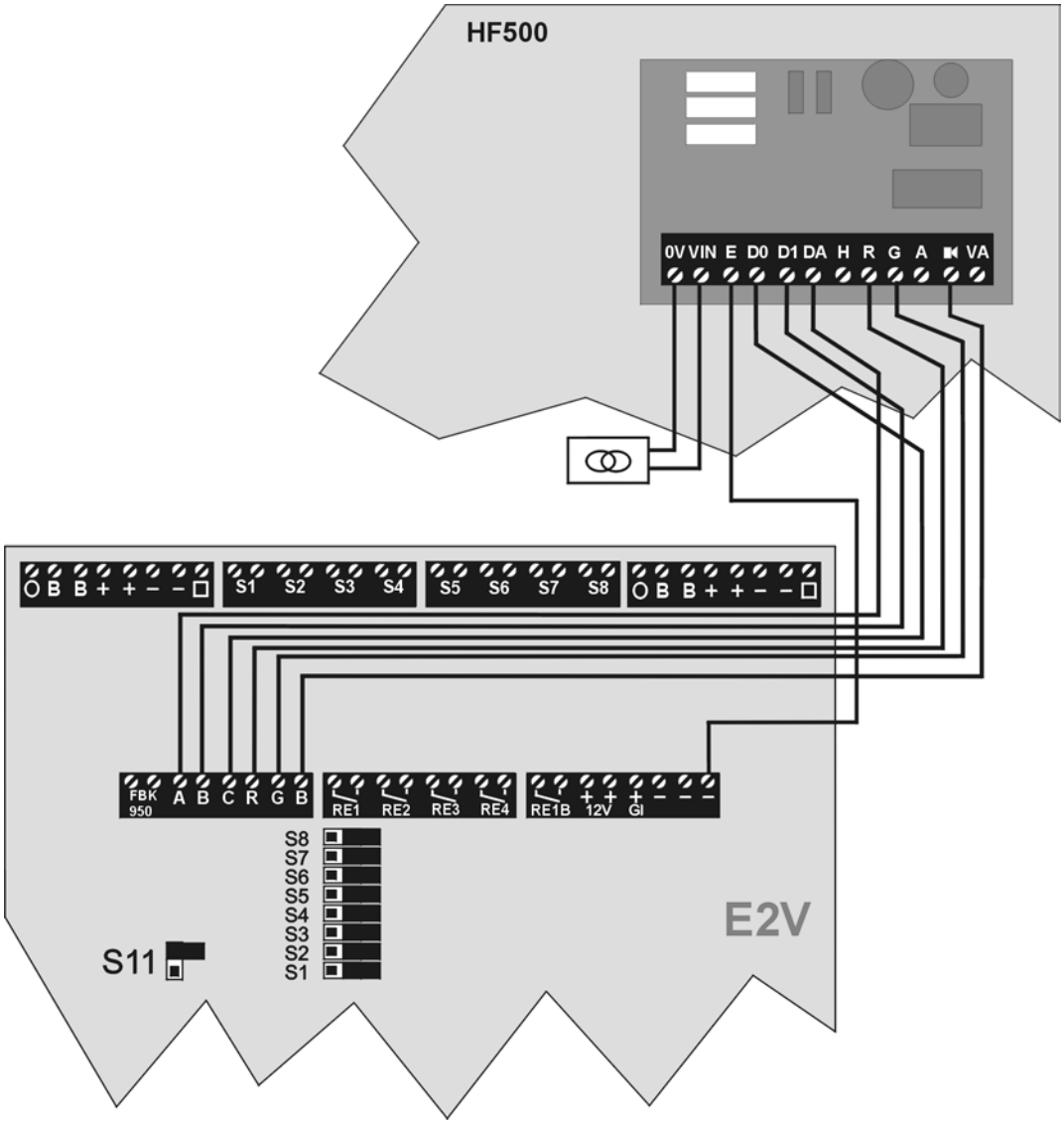
Connect to
**E2V**

# Connect HF500

The HF500 is a compact hands-free reader for connection to Bewator 2010. The HF500 is for indoor mounting and is compatible with both active and passive Bewator cards and tags. Hands-free readers read cards or tags without them being in contact with the reader.

The reader continuously transmits a low-power radio frequency. When a card or tag is presented within the field of the reader, it activates and transmits a unique identification number back to the reader. The reader then sends this code to the connected control unit in Bewator 2010.

Readers corresponding to the ISO 7811/2-standard can be connected to E2V units. The example below shows how the HF500 is connected to an E2V node.



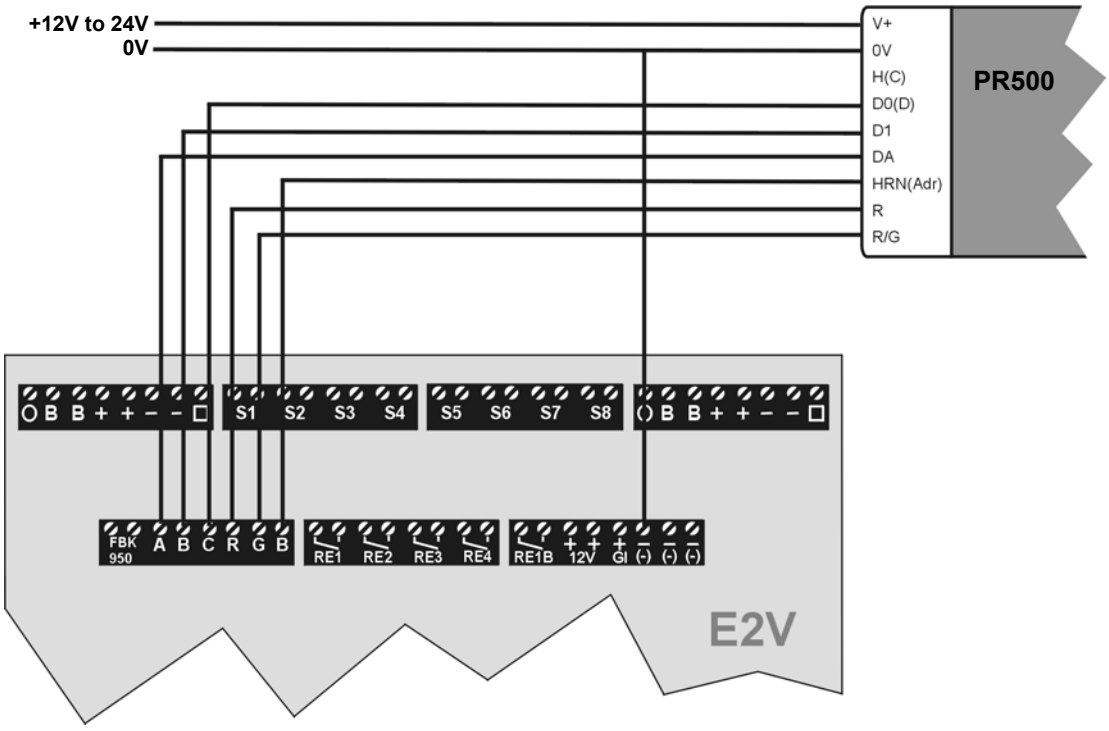
Connect to
**E2V**

# *Connect PR500*

PR500 is a proximity card reader for connection to Bewator 2010. The PR500 is for both indoor and outdoor mounting. The reader is compatible with both active and passive Bewator cards and tags.

The PR500 proximity reader reads cards or tags without them being in contact with the reader.

The reader continuously transmits a low-power radio frequency. When a card or tag is presented within the field of the reader, it activates and transmits a unique identification number back to the reader. The reader then sends this code to the connected control unit in Bewator 2010.



# Alarm components

This chapter contains connection examples describing how to connect some common alarm component types.

The examples describe connection of alarm components to nodes E2V and E2VL. Complete and save the document *Technical information* supplied with each E2 unit. This document must always be presented when referring to a warranty. The document furthermore includes the unique node address used on start-up and service. For the system documentation it is important to add this document.

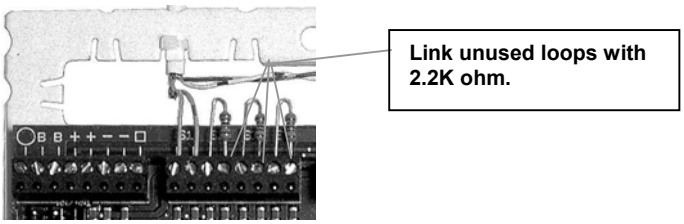
The following connection examples are described in this chapter:

- Double-balanced loop (general description). A double-balanced loop can be used for all types of alarm components and is the most common type of connection.
- Triple-balanced loop (general description). A triple-balanced loop can be used for all types of alarm components. However, Bewator does not recommend this connection type.
- Glass breakage detector GBD 310.
- Glass breakage detector GBD 300.
- Smoke detectors.
- PIR detectors (motion detectors).

## Unused loops

Link (terminate) unused loops in the E2V node.

> ***Exception***: If a keypad or card reader is connected to the node, input S8 should not be linked and be left unconnected.



**Connect to**
**E2V/E2VL**

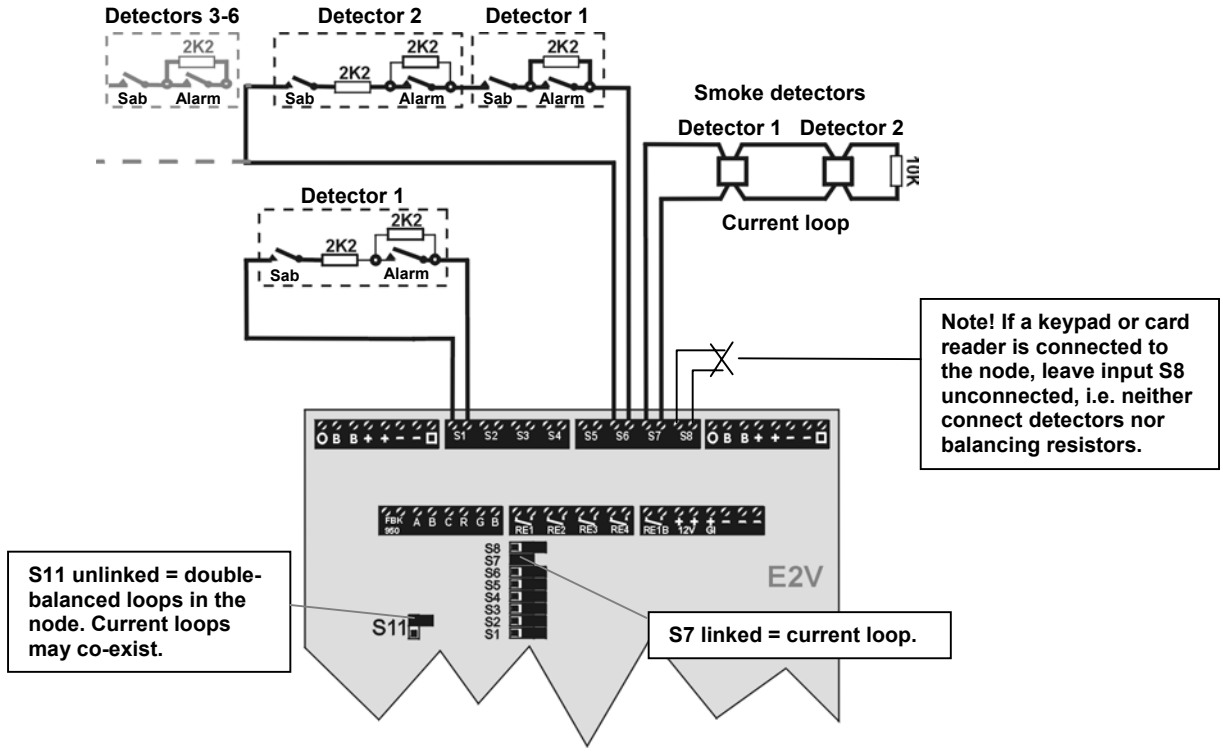
# *Double-balanced loop (standard)*

A double-balanced loop represents **one** addressable input in the node. Loops can be connected to inputs S1-S8. Up to six detectors can be connected to each loop. If a card reader or keypad is connected to the node, do not connect anything to input S8.

If needed, any loop can be switched to a current loop, e.g. if glass breakage or smoke detectors need to be connected directly to the E2. For smoke detectors, we recommend that no more than **two** smoke detectors are connected to each current loop.

All types of standard components can be connected to each loop, e.g. push buttons, sensors, door contacts and other passive alarm components.

> ***Note!*** All loops detect broken contact (NC). Keep this in mind when you connect e.g. push buttons, which are often designed for closing contact when operated.




| Double-balanced loop: | |
|---|---|
| **Condition** | **Detected as** |
| Short circuit = < 1.5 K Ω | Sabotage |
| No alarm = 2.2 K Ω | Normal condition |
| Alarm > = 4.4 K Ω | Alarm |
| Interruption = > 20 K Ω | Sabotage |

| Current loop | |
|---|---|
| **Condition** | **Detected as** |
| Short circuit < 250 Ω | Sabotage |
| Alarm < 5 K Ω | Alarm |
| No alarm = 10 K Ω | Normal condition |
| Interruption > 18 K Ω | Sabotage |

**Connect to**
**E2V/E2VL**

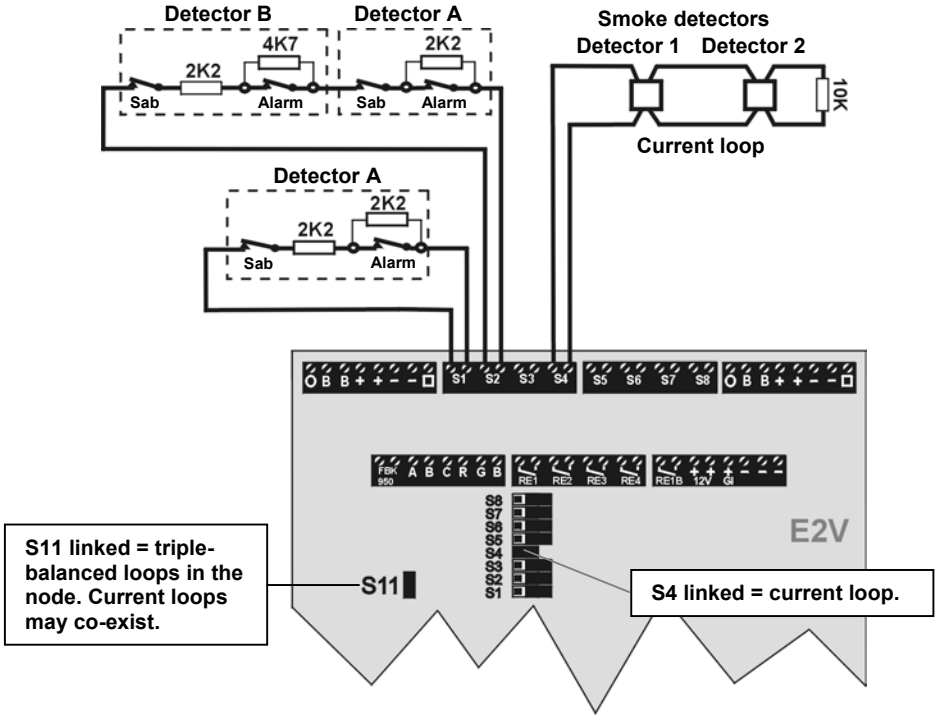
# *Triple-balanced loop (exception)*

> ***Note!*** Bewator recommends that triple-balanced loops are only used in exceptional cases, e.g. when existing cabling does not support a double-balanced connection.

Using the S11 jumper (see picture below), the node's inputs can be switched to triple-balanced. This means that each loop has **two** addressable inputs (see table below). Detectors can only be connected to inputs S1-S4. The remaining inputs are disabled.

Like with double-balanced loops, separate loops can be switched to current loops. As a current loop, the whole the loop is switched, which results in **one** addressable input.

All types of standard components can be connected, e.g. push buttons, sensors, door contacts and other passive alarm components.




| Triple-balanced loop: Condition | Detected as |
|---|---|
| Short circuit = < 1.5K Ω | Sabotage |
| No alarm = 2.2K Ω | Normal condition |
| Only alarm A = 4.4K Ω | Alarm address A |
| Only alarm B = 6.9K Ω | Alarm address B |
| Both alarm A and B = 9.1K Ω | Alarm address A and B |
| Interrupted loop = > 10K Ω | Sabotage |

**Connect to**
**E2V/E2VL**

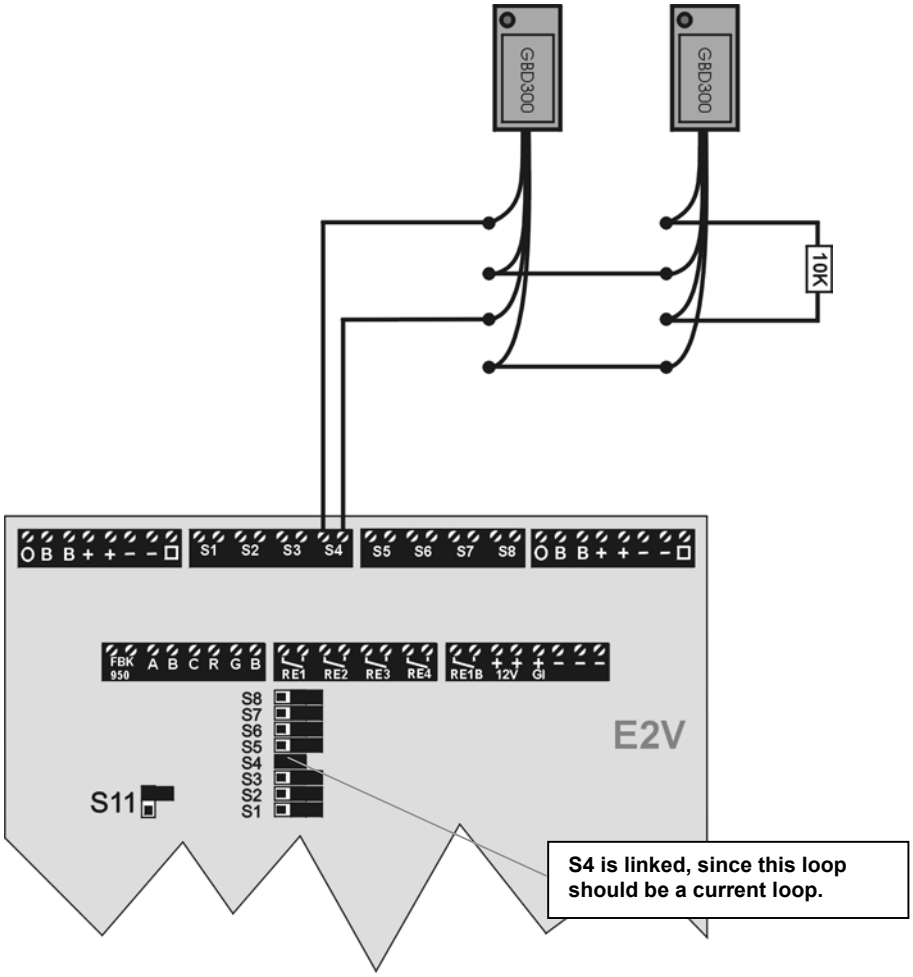
# *Connect glass breakage detector (GBD 300)*

The example below shows how to connect GBD 300 type glass breakage detectors with a built-in alarm resistor.

The GBD 300 normally requires an analyzer between the detector and the central unit. In Bewator 2010, the E2 nodes are especially designed for direct connection of GBD 300s. The current loop powering the glass breakage detectors can reset the sensors if a reset operation is performed.

1-20 glass breakage detectors can be connected to each double-balanced loop. Connect the loop resistor (10K ohm) as close to the last glass breakage detector on the loop as possible. Each loop has only one addressable input. Thus, if more than one detector is connected on the loop, each detector cannot be distinguished separately in case of an alarm. The loop detects the alarm as a group.

Bewator recommends that only one detector is connected to each input, since this will give a more detailed detection system. Exceptions are bar-separated windows or rooms where it is obvious which detector has triggered the alarm.



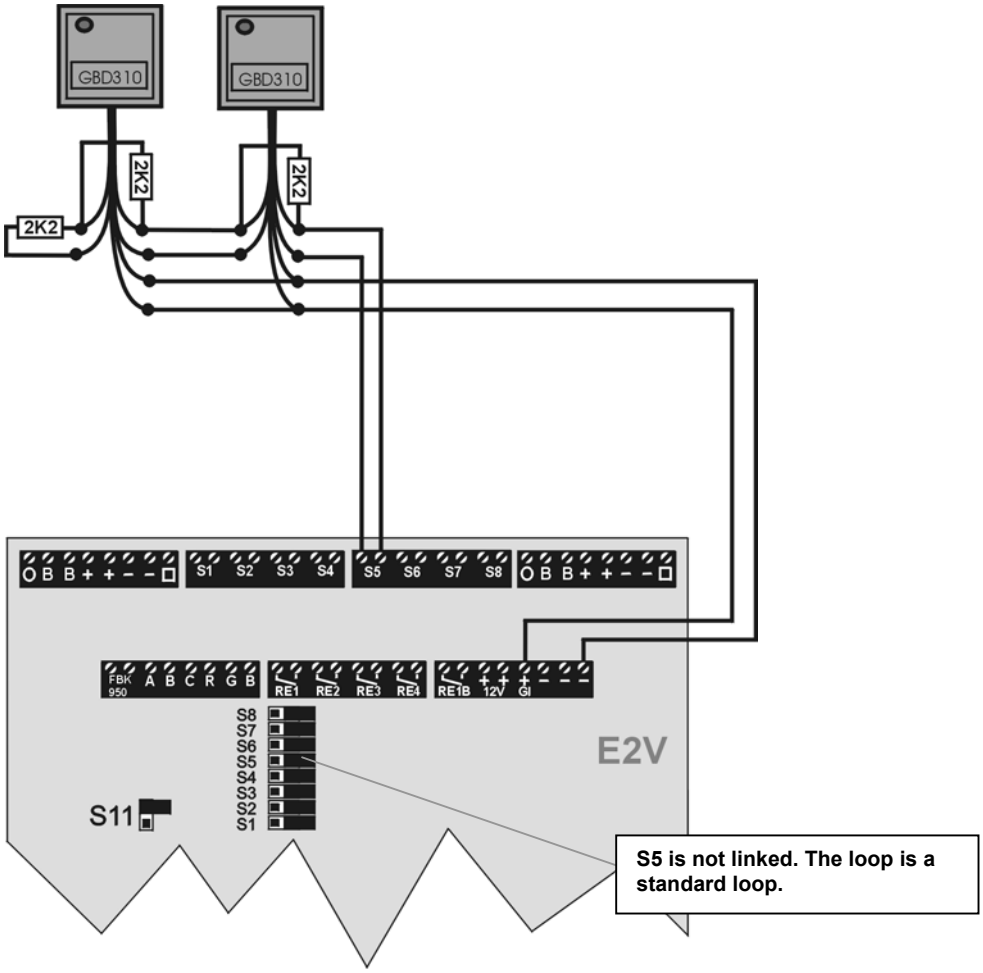
Connect to
**E2V/E2VL**

# Connect glass breakage detector (GBD 310)

The example below shows how to connect GBD 310 type glass breakage detectors with a built-in ”relay function”. The GL output, powering the glass breakage detectors, can reset the detectors if a reset operation is performed.

1-6 glass breakage detectors can be connected to each loop. Connect the loop resistors (2.2K ohm for a standard loop) as close to the last glass breakage detector on the loop as possible. Each loop has only one addressable input. Thus, if more than one detector is connected on the loop, each detector cannot be distinguished separately in case of an alarm. The loop detects the alarm as a group.

Bewator recommends that only one detector is connected to each input, since this will give a more detailed detection system. Exceptions are bar-separated windows or rooms where it is obvious which detector has triggered the alarm.



**Connect to**
**E2V/E2VL**

# *Connect smoke detectors*

Normally, only one smoke detector should be connected to each loop (see exception on next page). Connect the sensors according to the connection example below. An external LED can be connected to help identify which detector has been triggered, in cases where detectors have been mounted above false ceilings, under computer floors or in an attic. If current loops are connected, link optional input (S1-S8) according to the picture below.

If a card reader/keypad is connected to the node, leave input S8 unconnected.

Below is a description of how to connect smoke detectors with the B401 holder:

1 Mount the smoke detector holder.

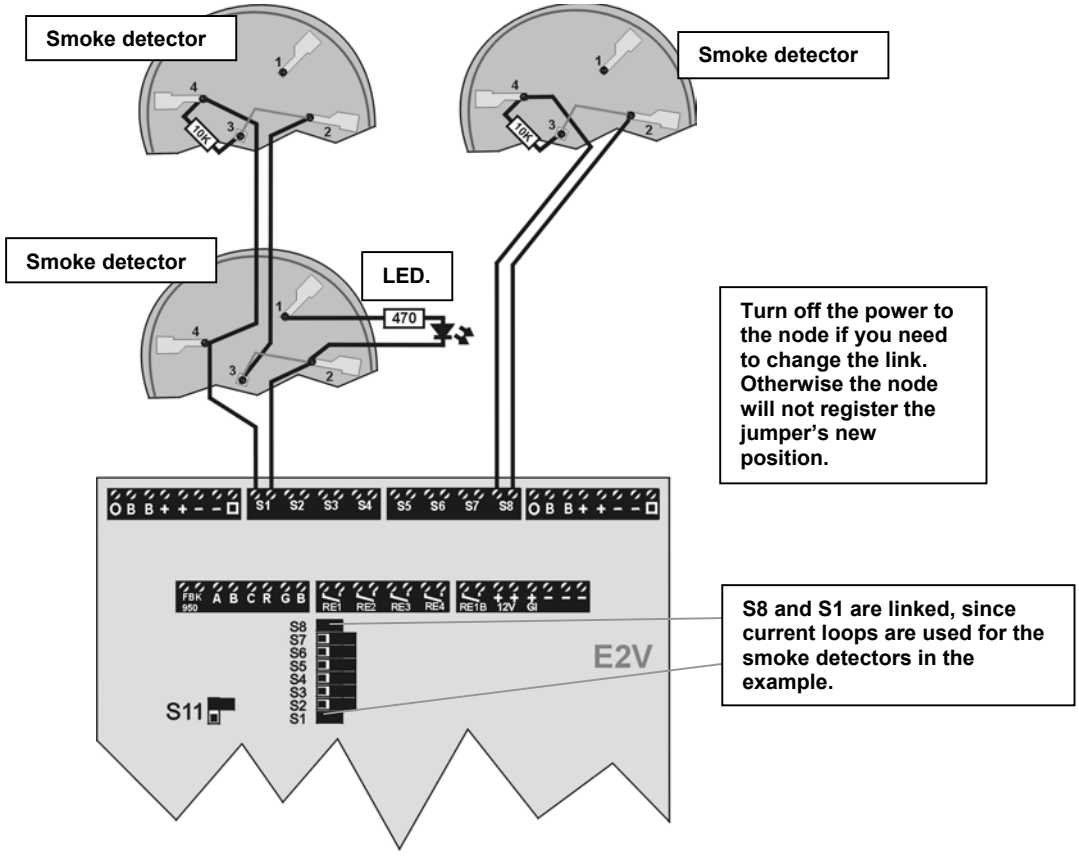
2 Connect the cable and install the 10K ohm end resistor. Measure the loop (see the *Measuring* chapter).

3 Fit the detector in the holder.

4 Connect power to the E2 unit.

5 Remove the protective cover from the detector.

6 Function test the detector with test spray or a magnet.

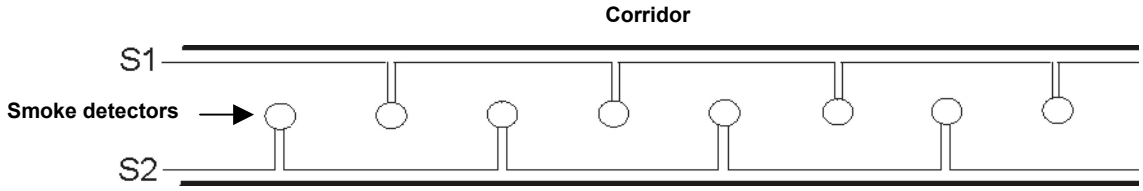

Smoke detector
Smoke detector
Smoke detector
LED.
10K
470
Turn off the power to the node if you need to change the link. Otherwise the node will not register the jumper's new position.
S8 and S1 are linked, since current loops are used for the smoke detectors in the example.
E2V
S11

## Smoke detectors in corridors

When smoke detectors are mounted in corridors, several detectors can be connected on one loop.

In the *Operator's Program Installation Manual,* you will find instructions on how to program an installation so that an evacuation alarm is activated when **one** smoke detector is triggered. You will also learn how to configure the installation so that a verified fire alarm is activated when **two** smoke detectors connected to different inputs are triggered.

To create the best setup for triggering a verified fire alarm as early as possible, connect the smoke detectors according to the example below.



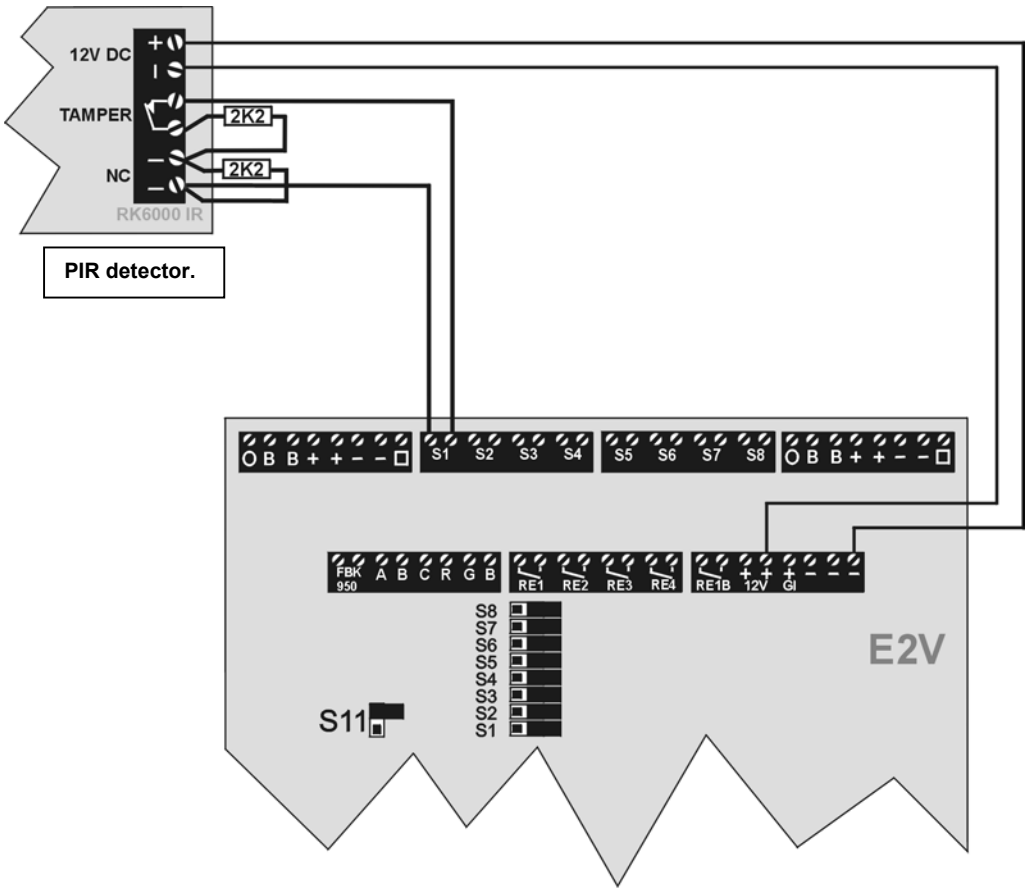

If the fire starts near a smoke detector connected to input S1, the next smoke detector affected by the smoke formation is a smoke detector connected to input S2. When two smoke detectors connected to different inputs are triggered, a verified fire alarm is activated. This way, the fire is detected as quickly as possible.

**Connect to**
**E2V/E2VL**

# *Connect PIR detectors*

The example below shows how to connect PIR detectors and similar components whose function require a power supply, so called active detectors. The E2 power output can be loaded with 225 mA at the most. The output has a current limitation and is protected against short-circuits. The resistors are connected to the detector's alarm output. The sabotage resistor is attached to the last detector on the loop. Unused loops should be linked with 2.2 K ohm in the E2.

If a card reader or keypad is connected to the node, leave input S8 unconnected.

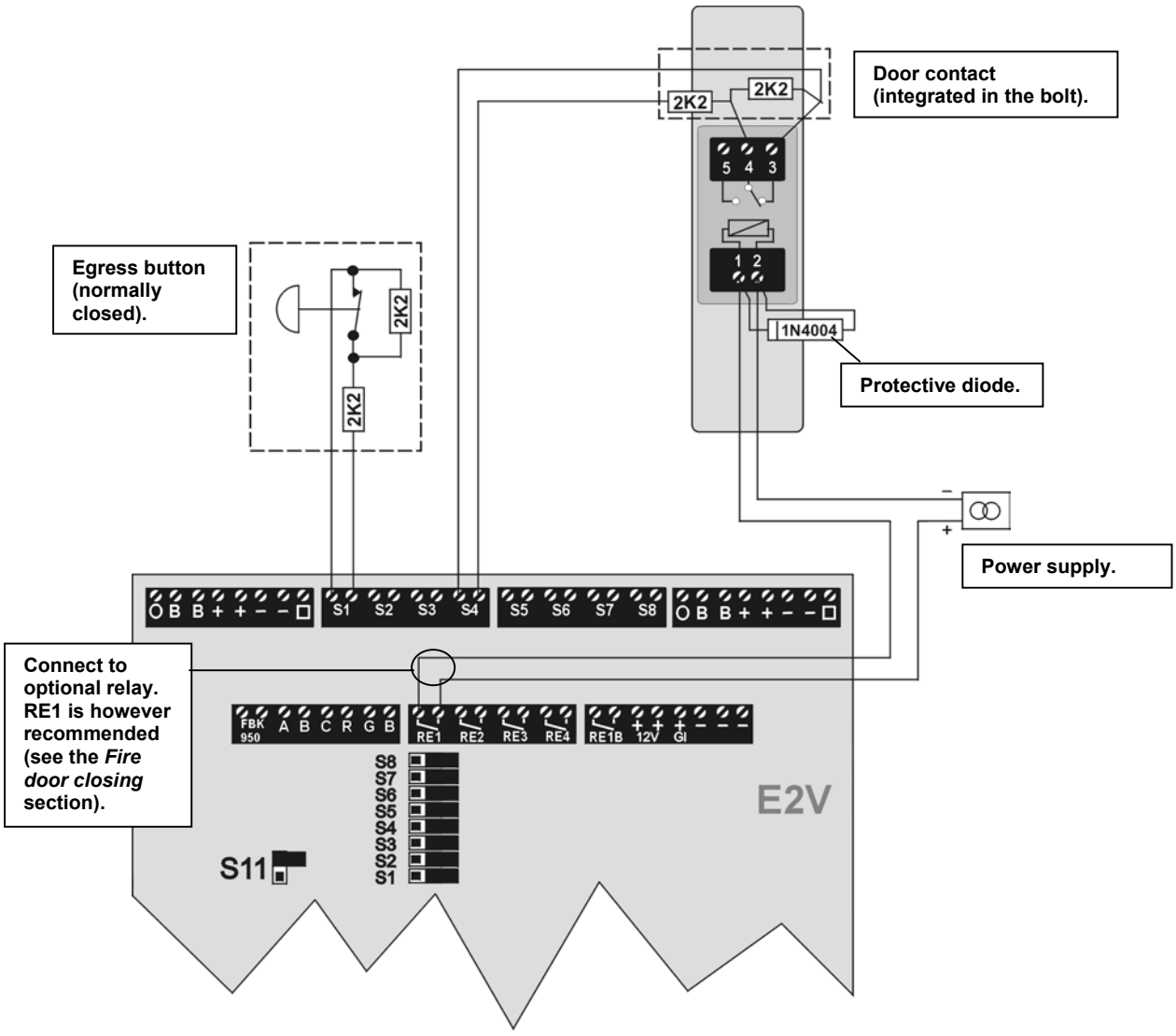


Connect to
**E2V/E2VL/E6**

# Electric locks and motor locks

## Electric lock with door monitoring

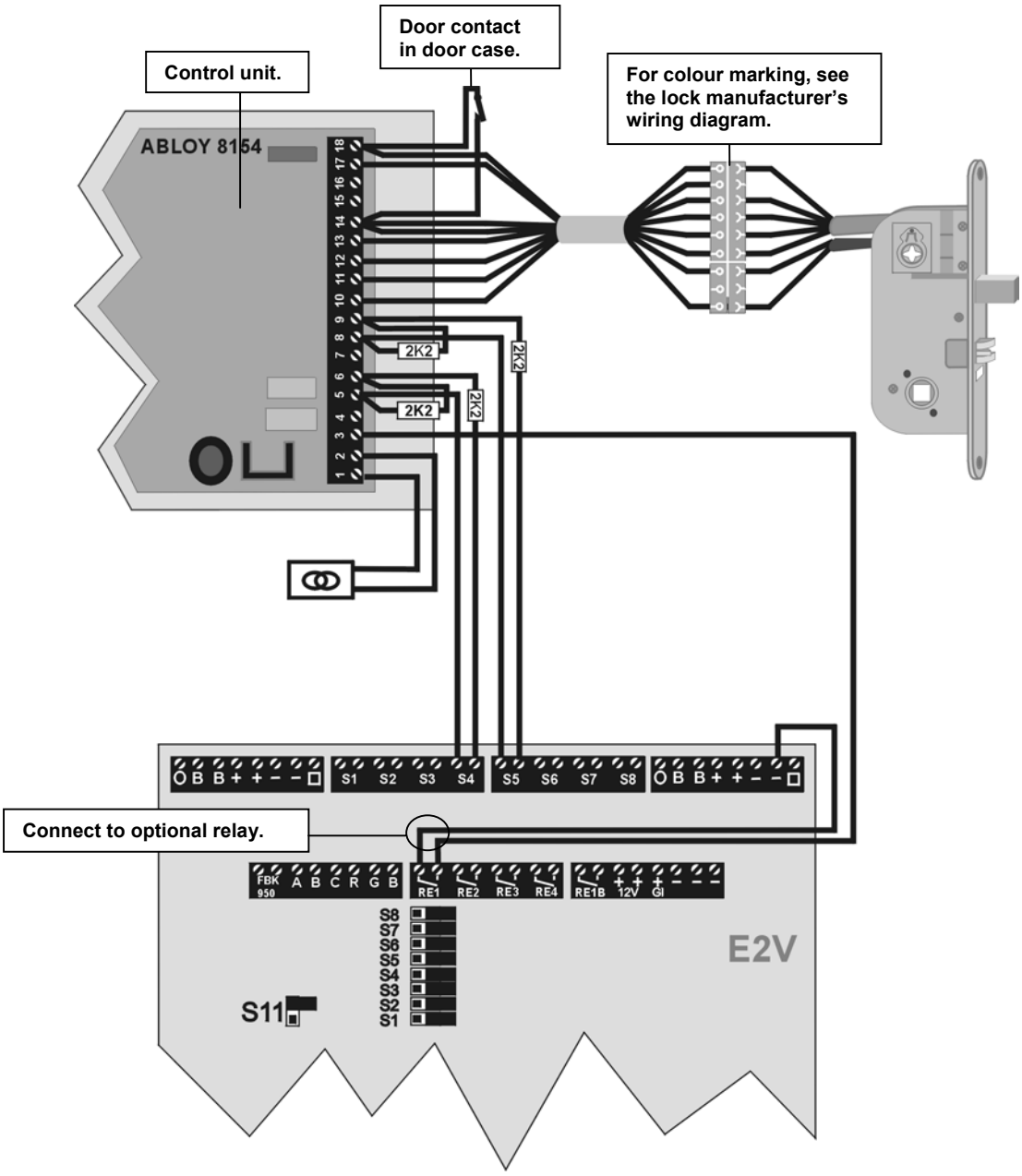
It is important to always connect a protective diode over the electric lock's coil. The diode is needed to prevent sparks from induction discharges in the lock's coil. These sparks can damage the relay contacts. If the door should be monitored, a door contact should be fitted. Connect the door contact to a separate input. This will enable both conventional alarm detection and door status control for the door's access control function. The door contact can also be completed with a lock contact, in order to detect whether or not the door is securely locked. As a door exit function, an egress button can be used. Connect the egress button to a separate input.



**Connect to**
**E2V/E2VL/E6**

# *Motor lock with door monitoring*

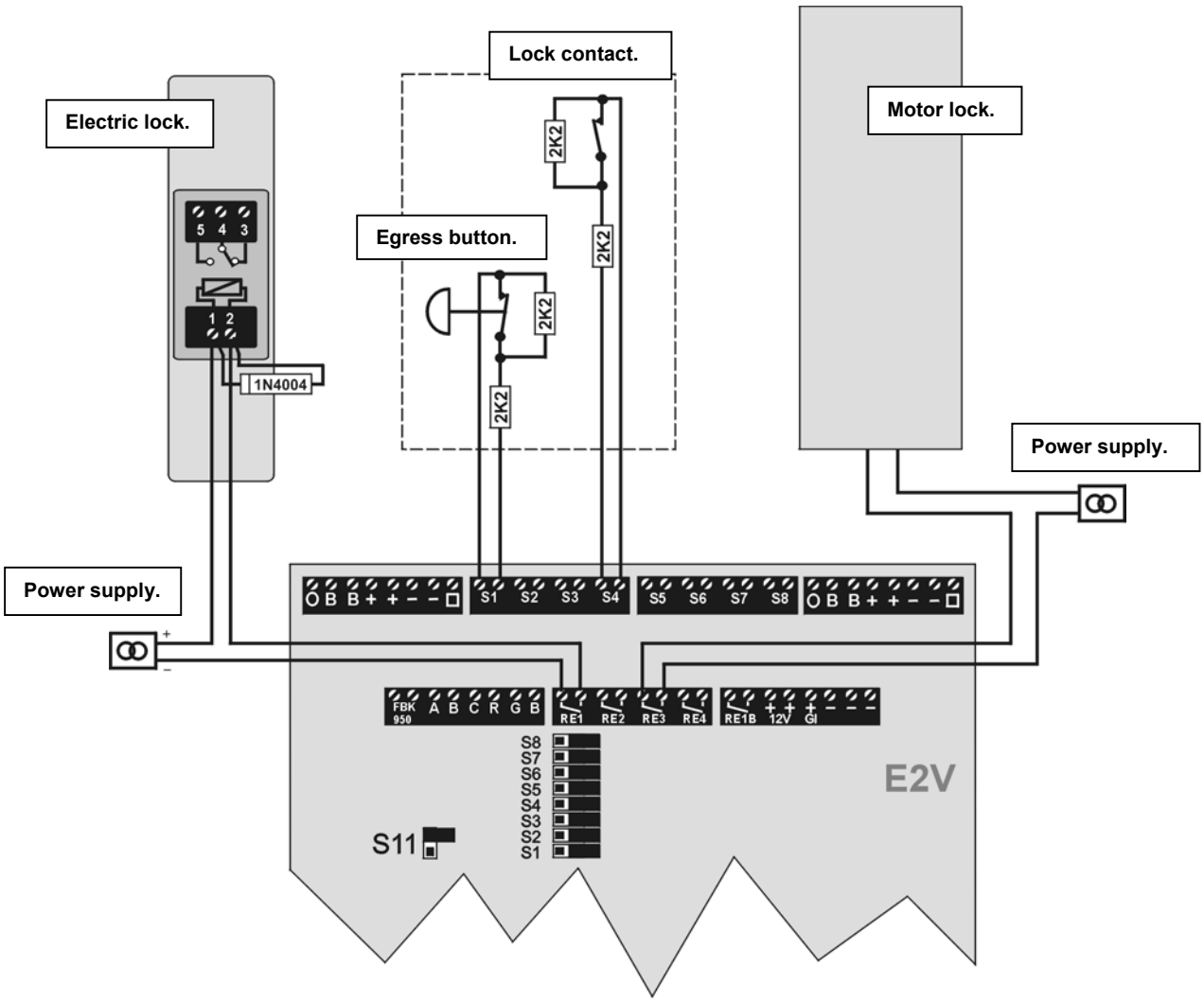
Connecting motor locks to E2V is done in the same way as with electric locks. Follow the lock manufacturer's instructions concerning connection of external control units and similar components. The picture below shows how to connect an ABLOY motor lock with the adhering control unit ABLOY 8154. The lock contact indication can be connected as a separate input (see the picture). The door contact in the door case can be connected directly to the ABLOY control unit. This is however not recommended if the door contact should be used for intruder alarm.



Connect to
**E2V/E2VL/E6**

# Connect electric lock and motor lock

In installations where both motor locks and electric locks are desired, connection is done as described below. In the operator's program you can later limit the motor lock's function to certain hours, e.g. to simplify entrance during office hours.




Motor locks and electric locks can be connected to optional relay contacts. Bewator however recommends that electric locks are always connected to RE1. Partly because the fire door closing function requires this and partly because this will be a consistent method of connecting components.

**Connect to**
**E2V/E2VL/E6**

# Sirens

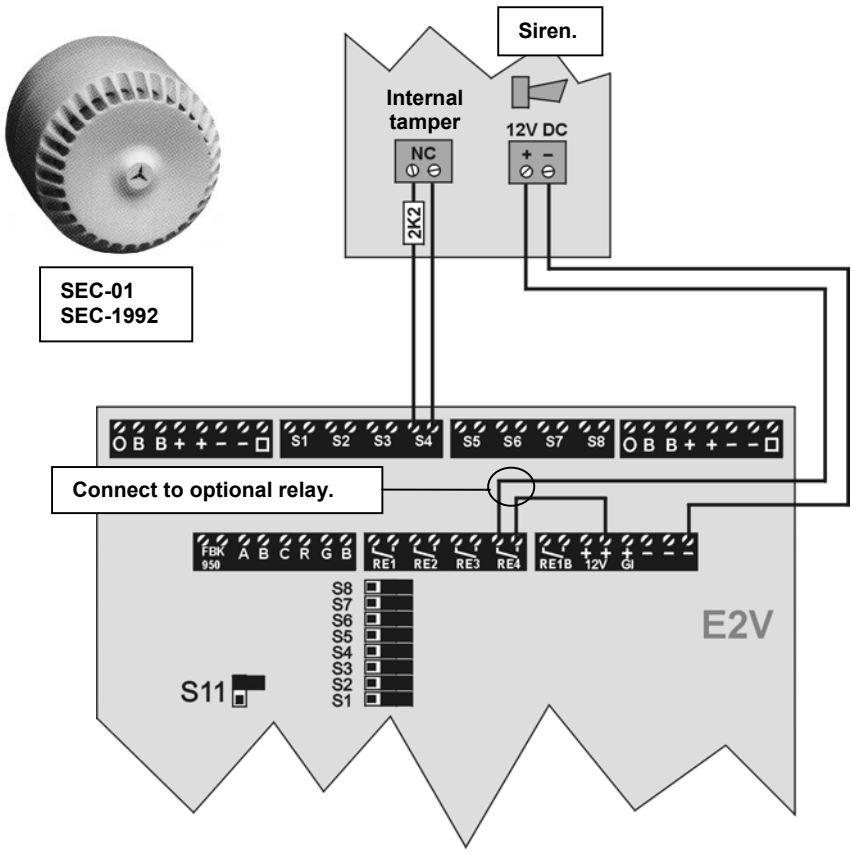
## Connect sirens

Sirens can be connected to Bewator 2010 for local acoustic alarms on triggered intruder alarms, fire alert or other events requiring attention.

Any relay in E2V, E2VL or E6 can be used to connect sirens. In addition, different siren characteristics can be selected in the operator's program.

The example below shows how to connect a 12V siren. Since the maximum utilized current from the E2's 12V output is limited to 225mA, it is important to select low-power sirens. If the siren should give warning signals on alarm delays, make sure to select sirens that can produce a clear tone on a short relay operation.

Bewator recommends that one of the sirens SEC-1992 or SEC-01 is used. On other voltages than 12V, the siren can be powered from an external power source via the node's manoeuvre relay. The example below shows how to connect a tamper alarm to the siren. A 2K2 ohm serial resistor is needed to detect sabotage from the siren's tamper contact.



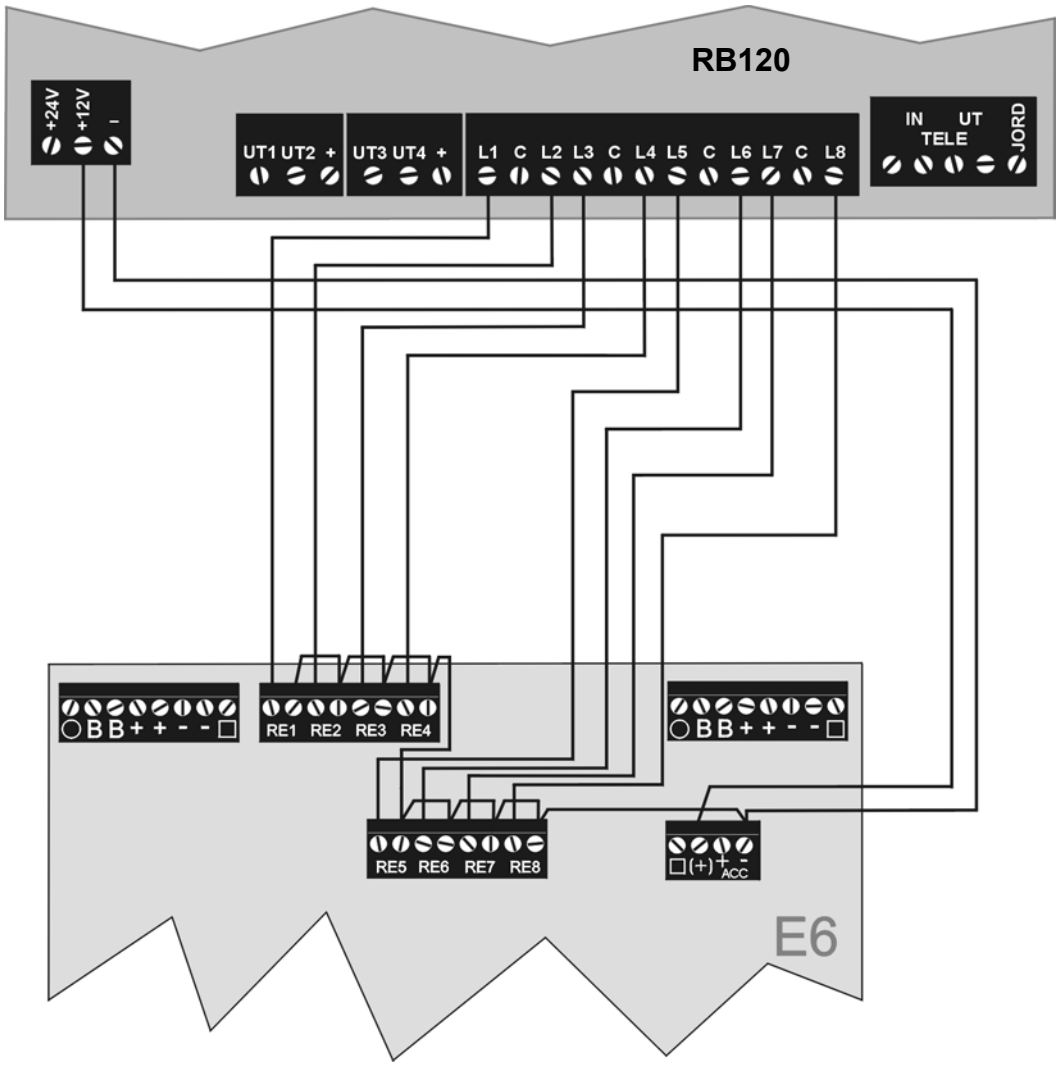
Connect to
**E6**

# Alarm transmitters

Alarm transmitters are usually connected to the E6 relay node. It is also possible to connect the alarm transmitter to relay outputs in the E2V or E2VL nodes.

## Connect RB120

Set up the E6 relays so that negative voltage activates the alarm inputs in the alarm transmitter.



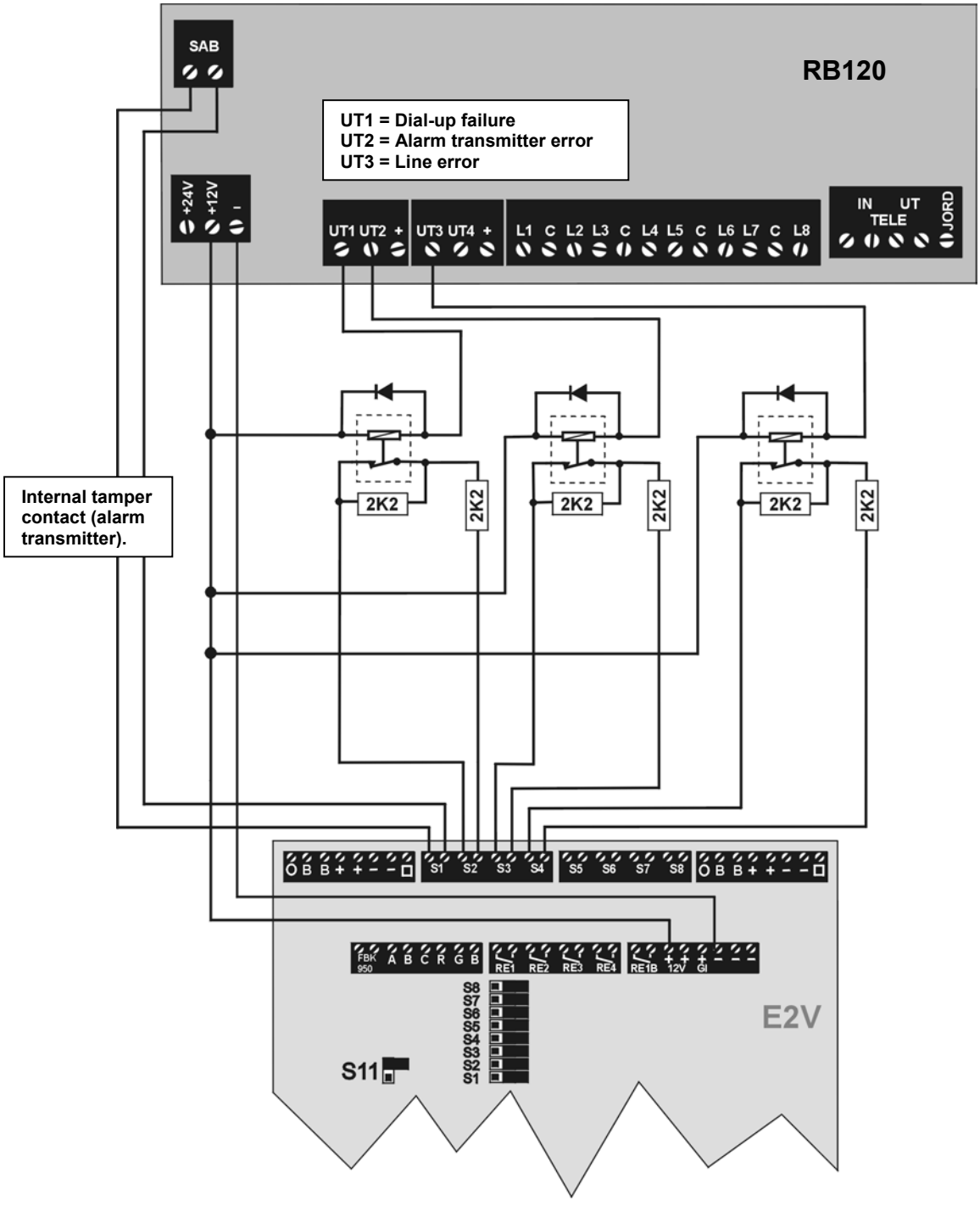

In the *Operator's Program Installation Manual* you will find instructions on how to program the E6 relay outputs. For example, you can define the RE1 relay output the be activated by fire alarms.

In the RB120 documentation you will find instructions on how to program the alarm transmitter.

**Connect to**
**E2/E2VL**

# *RB120 with monitoring*

To be able to detect sabotage and other alarm transmitter errors, connect the relevant outputs to the desired node according to the schedule below. If monitoring is desired, an intermediate relay should be used. Connect the 1N4007 protective diode over the relay.



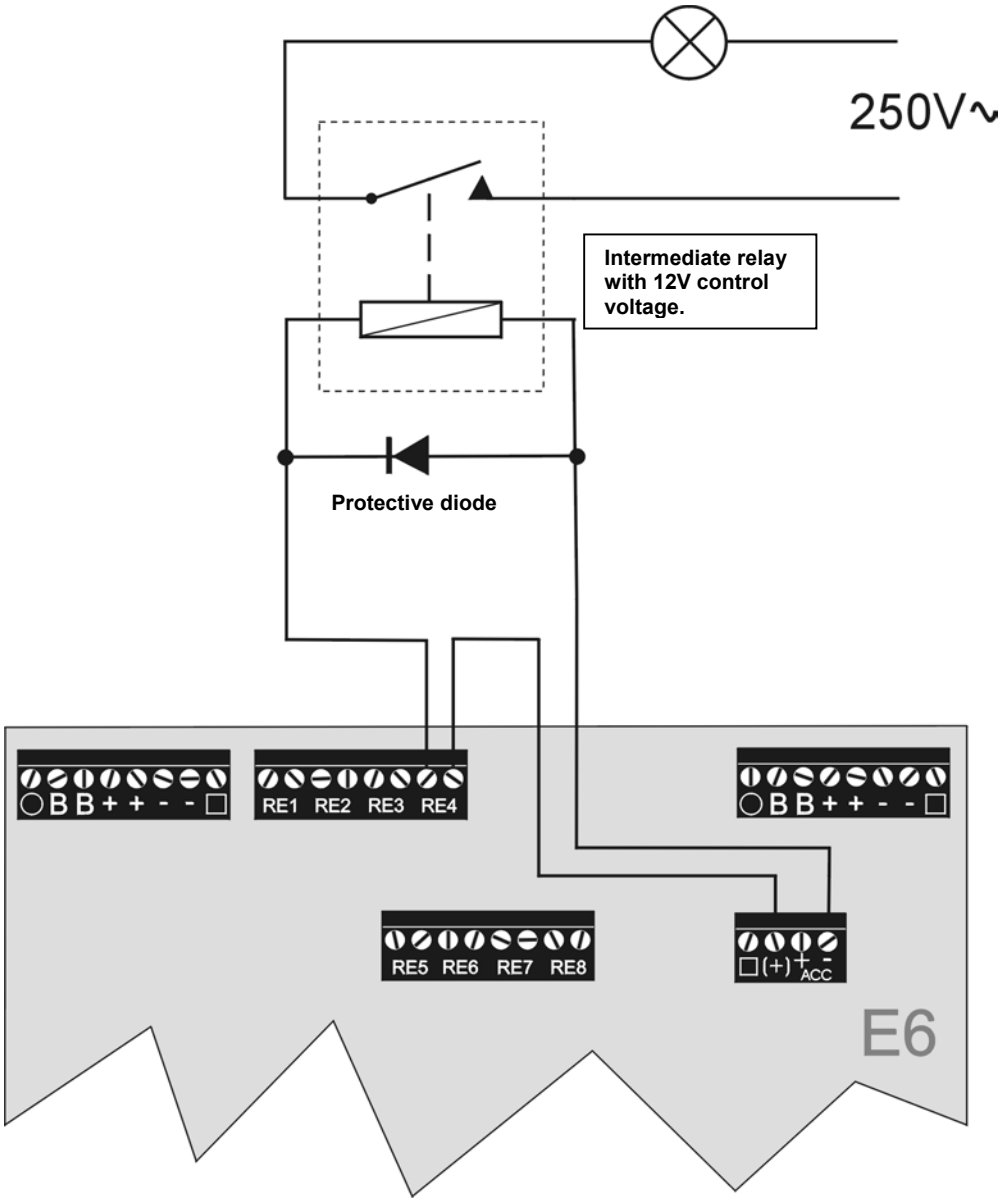
Connect to
**E6**

# Other applications

This chapter contains connection examples for other applications of the Bewator 2010 system.

## High-voltage control

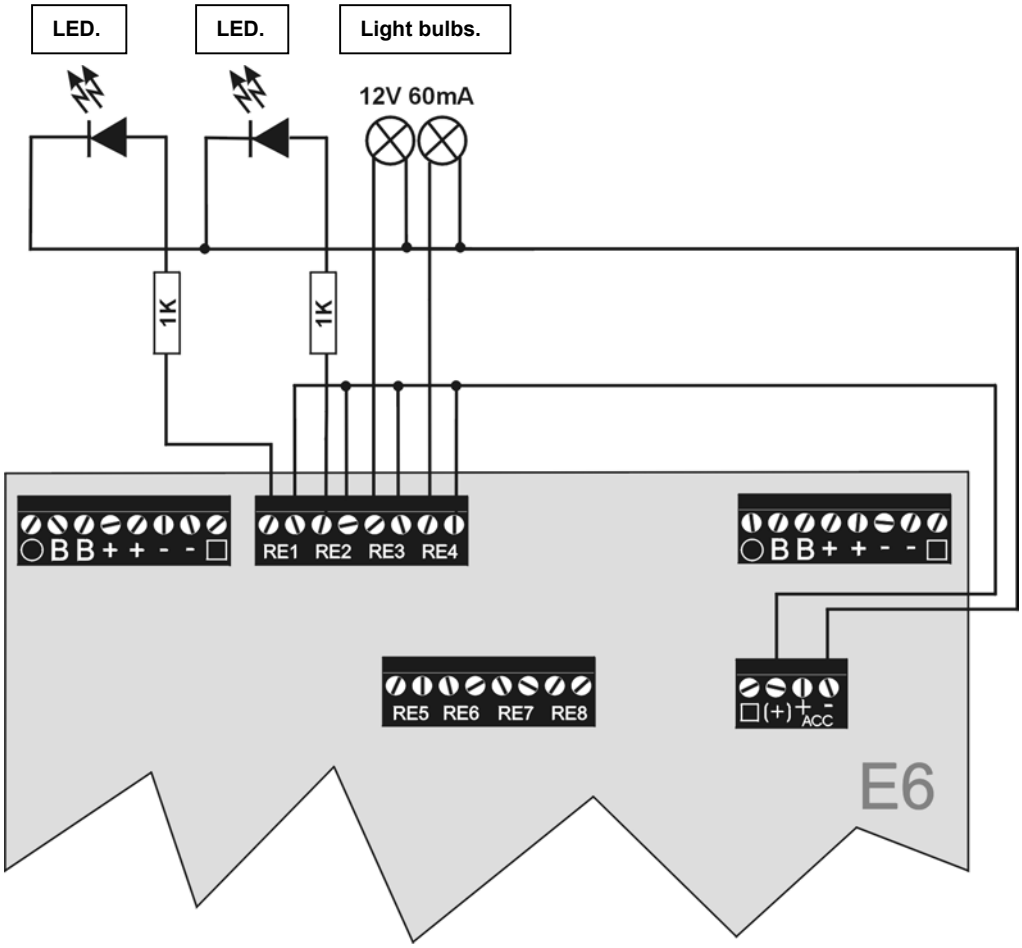
If the E6 node should control high-voltage equipment with voltage exceeding 50V (e.g. lifts), an intermediate relay or contactor is required. The relay should be intended for 12 or 24V DC control. Semi-conductor relays can also be used. The diode is a 1N4007 protective diode and is always connected when mechanical relays are used.



**Connect to**
**E6**

# *Indication control*

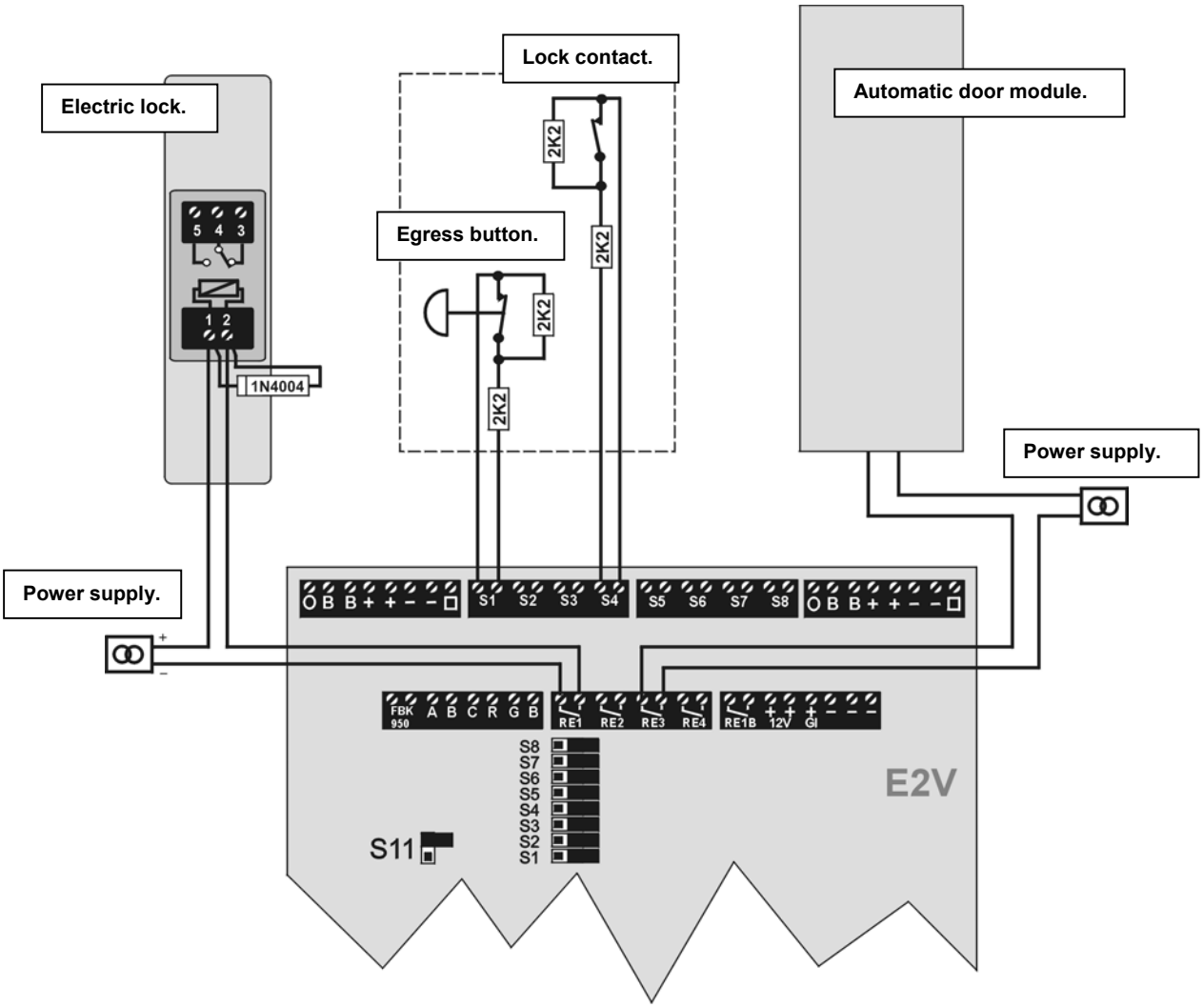
The E6 relay node is well suited for different types of indication control. If LEDs are connected, a 1K ohm current limitation resistor is required.



Connect to
**E2V**

# Automatic doors

This section describes how to connect an electric lock and an automatic door module. The example below shows that the relay indicates locked or unlocked door. This way, the automatic door function cannot open the door until the lock is unlocked. If an egress button is required, a large push button (often used to simplify entrance for disabled persons) with two switching contacts can be used. The breaking contact should be connected to a separate input to operate unlocking. The closing contact should be connected to the automatic door module to operate door opening.

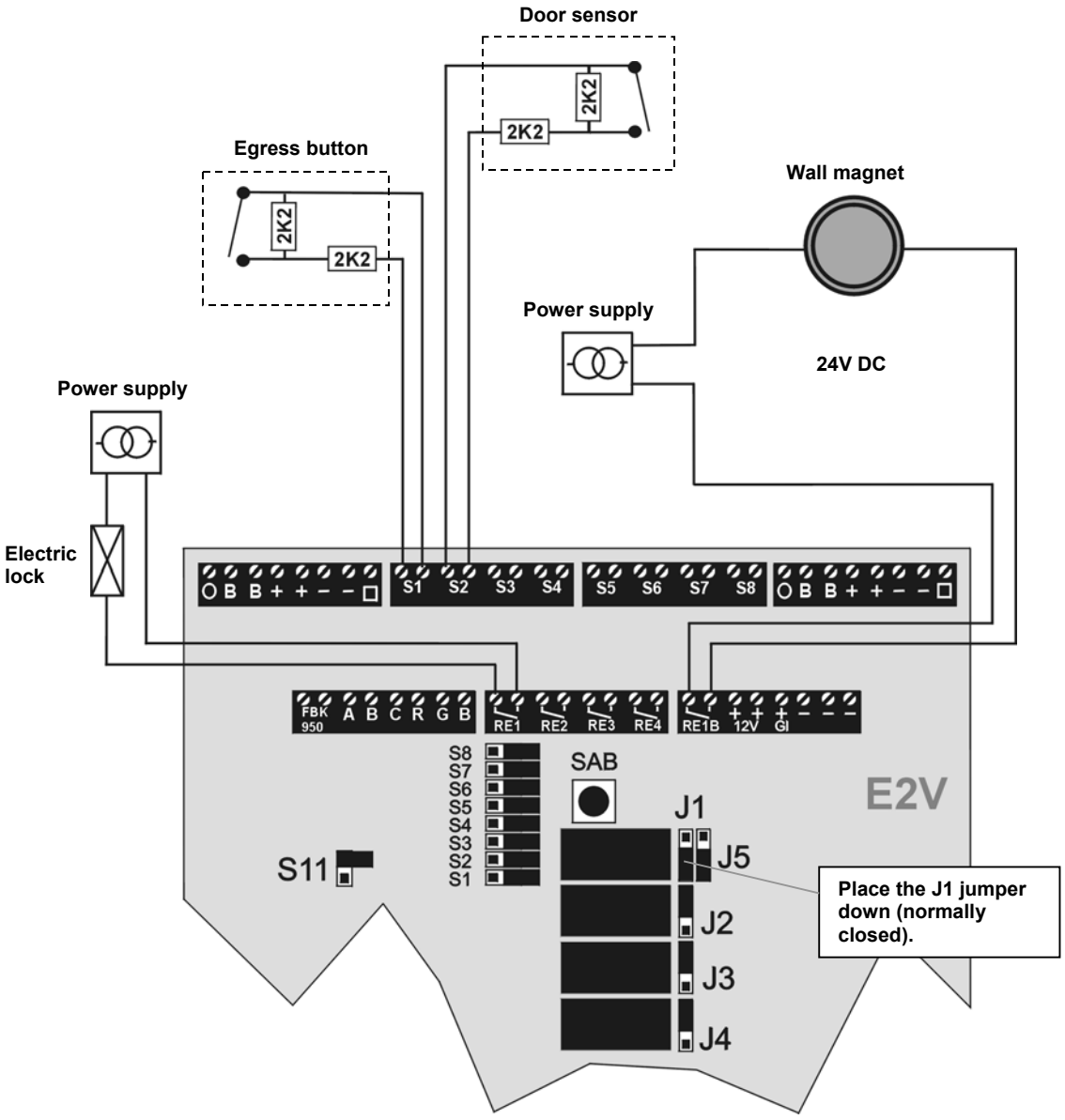



The electric lock and the automatic door module can be connected to optional relay contacts. Bewator however recommends that electric locks are always connected to RE1. Partly because the fire door closing function requires this and partly because this will be a consistent method of connecting components.

Connect to
**E2V**

# *Fire door closing*

Bewator 2010 can also be used for fire door closing. This means that optional relays can be activated whenever fire alert is triggered. At the same time, one or several push buttons can be connected to operate fire door closing manually. In addition, an egress button can be allocated a split function, i.e. both open the electric lock and close one or several fire doors on triggered fire alert.




The fire door closing function when connected according to the above example is described on the next page.

## Function

If fire door closing is connected according to the picture on the previous page, the following function is obtained:

When the user presses the egress button, the electric lock opens at the same time as the wall magnet loses voltage. When the user then opens the door, the door sensor is affected. The electric lock is locked and the wall magnet regains voltage. The user then has the option to have the door held open using the wall magnet or close the door again.

When a fire alarm is triggered, the wall magnet loses voltage and the electric lock is unlocked. If the door is closed, it is still possible to pass the door (the door is unlocked). If the door was held open with the wall magnet, the door closes but the electric lock is not locked.

## Settings in the operator's program

For the above function to work, the following settings have to be made in the operator's program:

In the **Definition of node** window (for the node where the electric lock is connected), on the **Door** tab, select **No action** for the **Door open too long** function. Otherwise the door cannot be held open with the wall magnet without affecting a siren or buzzer.

In the **Definition of output** window (for the electric lock), on the **Settings** tab**,** select FIRE_ALARM (or the corresponding control channel) in the **Superior forcing control channel** list box. When a fire alarm is triggered, the lock opens.

## Other settings

The electric lock should have a failsafe function, i.e. require voltage to stay in locked position. The RE1 and RE1B relay outputs should be set to normally closed (NC).

Thus, the following applies for the electric lock (controlled by RE1): if nothing happens, the lock is powered. On normal lock opening or triggered fire alarm, the power is interrupted and the lock opens.

The same applies to the wall magnet (controlled by RE1B): If nothing happens, the magnet is powered. On normal lock opening or triggered fire alarm, the magnet loses voltage.

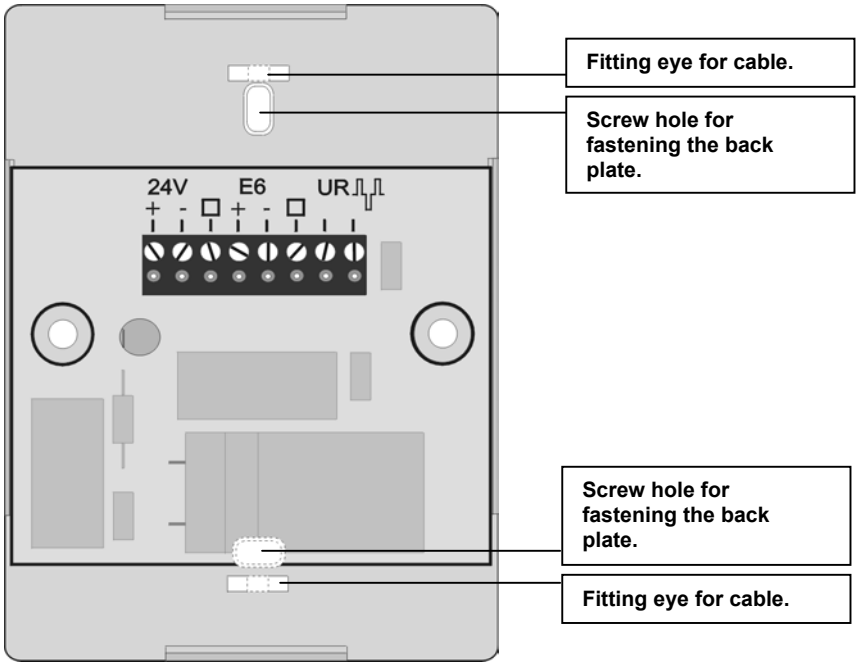
**Connect to**
**E2V/E2VL/E6**

# *RBMP2 – module for connection of slave clocks*

RBMP2 is a unit designed to operate slave clocks. A slave clock requires minute pulses with polarity switching 24V DC. The unit is controlled from the clock in E1 and is connected to E2 or E6.

## *Install RBMP2*

The upper and lower parts of the plastic box contain assembly holes for screws. To access the lower hole, remove the circuit board by carefully wobbling the card back and forth until it comes off. To put the card back, carefully press the card onto the box until it snaps into place. Next to each assembly hole there is an eye for stripes.

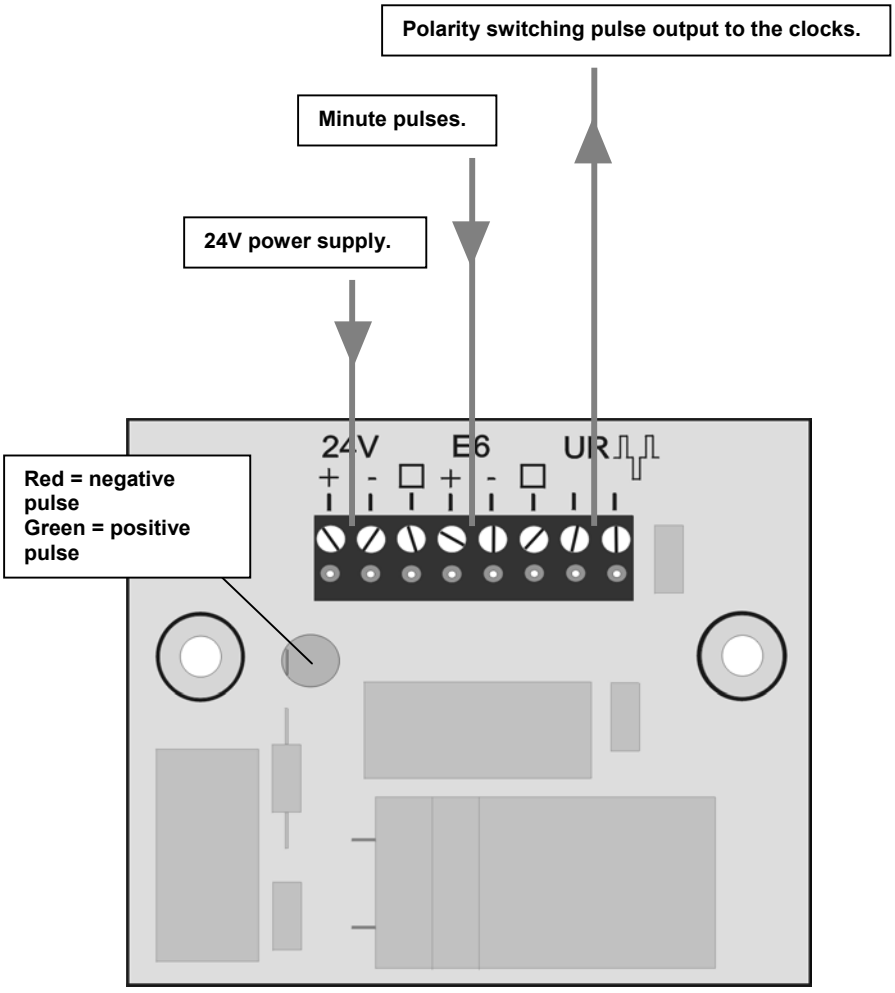



| Symbol | Explanation | Symbol | Explanation |
|---|---|---|---|
| 24V | Connection of 24 VDC power supply | UR ⎍⎍ | Connection of polarity switching pulses to slave clocks |
| E6 | Minute pulses from E2 or E6 | ☐ | Free connection points |

## Inputs and outputs

| Type | Number |
|---|---|
| Polarity switching output 24V DC to slave clocks. | 1 |
| Pulse input from E6 (12V minute pulse). | 1 |

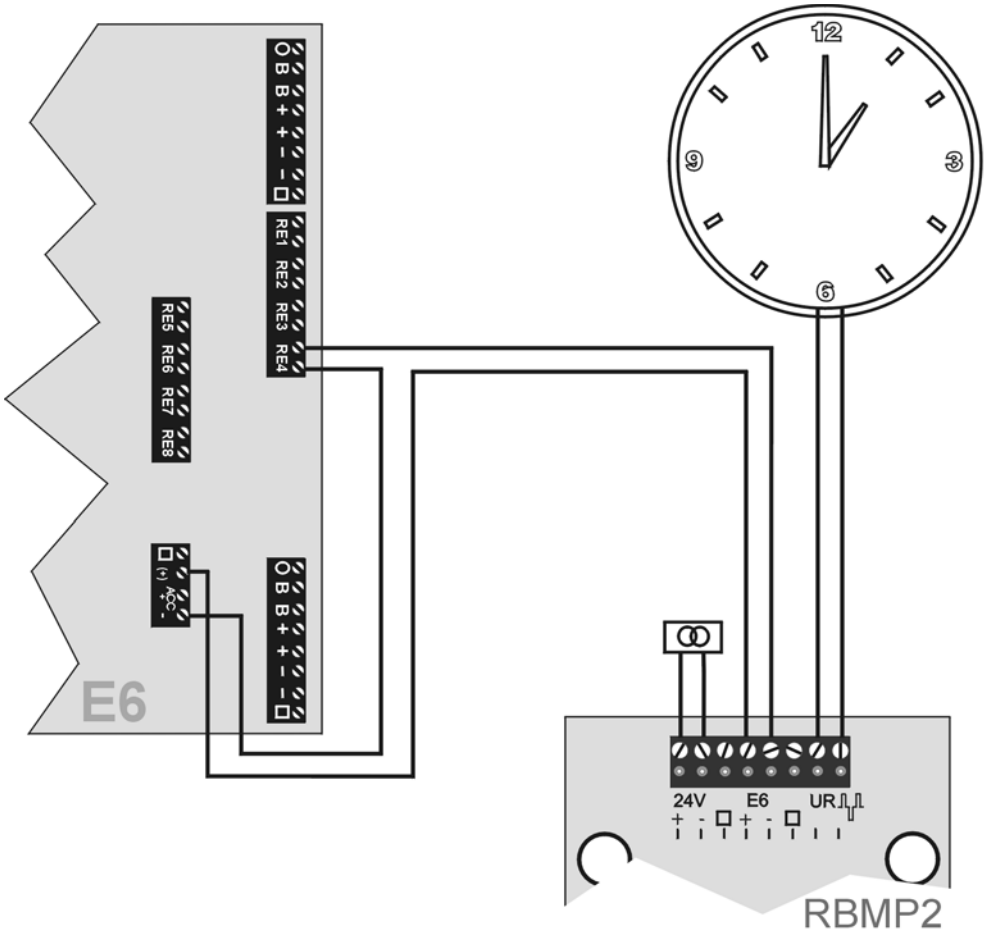
Minute pulses are received from a relay in an E2 or E6. The RBMP2 can be powered by a separate 24V DC power supply.



## *Connection example*

The connection example below shows an RBMP2 connected to a slave clock. Any relay in an E2 or E6 node can be defined as a minute pulse output in the operator's program (see the *Operator's Program Installation Manual*).

RBMP2 is powered with 24V DC. The pulses are controlled from the node's 12V output via a relay output to RBMP2, the input marked E6. In the example below, RE4 is used, but RBMP2 can be connected to any active relay as long as it has been defined as a minute pulse output in the operator's program.



# Install the E7 power supply

All E units can be powered with 20-60V DC. By selecting 24V, electric locks and similar equipment needed in the installation can also be powered. Make sure to calculate the power consumption in the installation before you decide how many power supplies are needed (see the *Calculate the power supply* chapter).

The need for battery backup is determined by the power consumption in the installation and the required stand-by period. There is always the possibility to complete the installation with an extra power supply to obtain the desired stand-by period.

## About the E7 power supply

E7 is a power supply designed with the latest primary switch technique to guarantee a high level of operations and long life for both electronics and batteries.

One or more E7 units can be connected to Bewator 2010 to power the installation. In case of a power mains failure, Bewator 2010 gets its power from the batteries until the power returns.

The communications card in the power supply unit automatically generates alarms to Bewator 2010 in case of power failure, battery/fuse errors and sabotage.

***Note! Observe great caution on installation, service and maintenance, since the high voltage (220 V) is extremely dangerous. If possible, turn off the power before you make adjustments or service the power supply.***

# Mount the cabinet

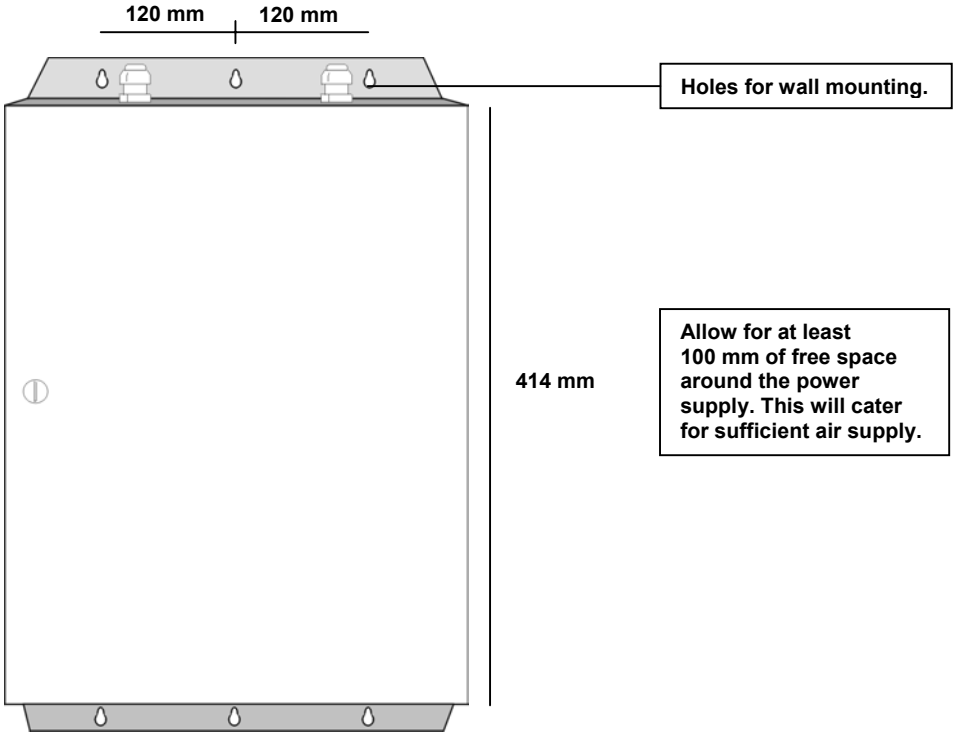
When you mount the cabinet on the wall, consider the following:

- Allow for at least 100 mm of free space around the power supply. This will cater for sufficient air supply.
- Mount the cabinet within an alarm-protected area.

Proceed as follows:

1 Fasten six wall screws on the wall according to the hole picture. With batteries, the cabinet weighs 45 kg. Be sure to use wall screws that can hold this weight.

2 Hang the cabinet on the wall screws so that they fit in the six holes on the top and bottom of the cabinet.


120 mm
120 mm
Holes for wall mounting.
414 mm
Allow for at least 100 mm of free space around the power supply. This will cater for sufficient air supply.

3 Finally, tighten the screws against the wall.

## Detach fixed parts

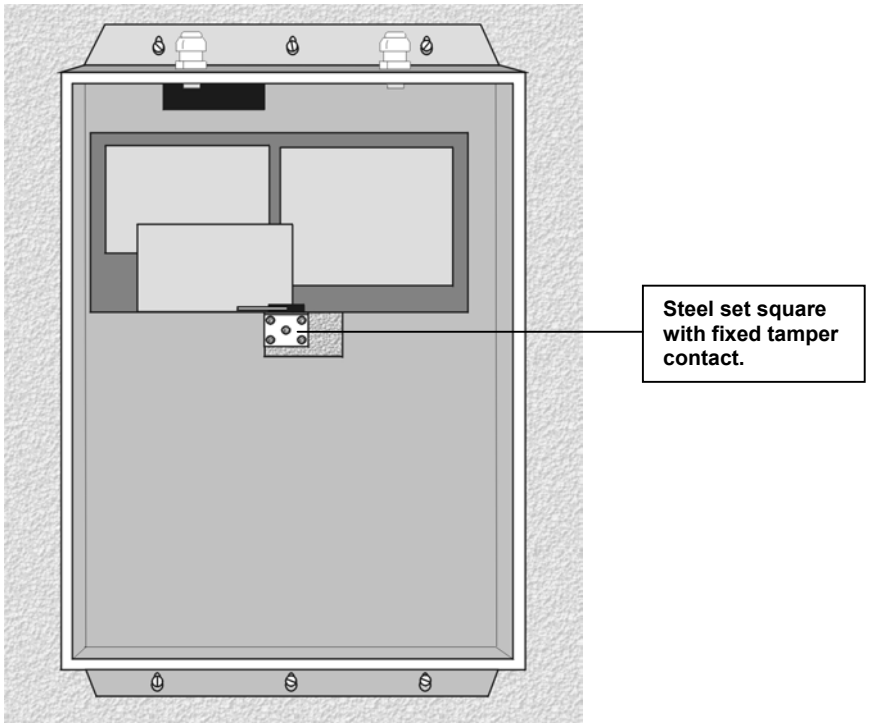
Open the cabinet door with the key supplied and detach the following parts that were fixed during transport:

- The tamper contact (steel set square with a fixed tamper contact).
- The battery plate (plastic plate with premounted cables). This should later be placed between the batteries. Be careful not to damage the battery cables.
- The battery strap. Loosen the buckle and unfold the straps so that they are not in the way when the batteries are placed in the cabinet.

## Mount the tamper contact

1 Hold the tamper contact so that the contact's steel tines are pointing away from the wall, towards the cabinet door.

2 In the square hole in the middle of the cabinet's back plate, insert the tamper contact's plate against the wall. Push the tamper contact's plate against the top left corner of the square hole.




3 Fasten the tamper contact with screws against the wall.

4 Test the function by closing the door. The door should push the contact's tines and a clicking sound should be heard.

5 When the system is in operation, test that the sabotage alarm is triggered when the door is opened, **before** an opening between the door and the cabinet is visible. If needed, adjust the tamper switch until this function is obtained.

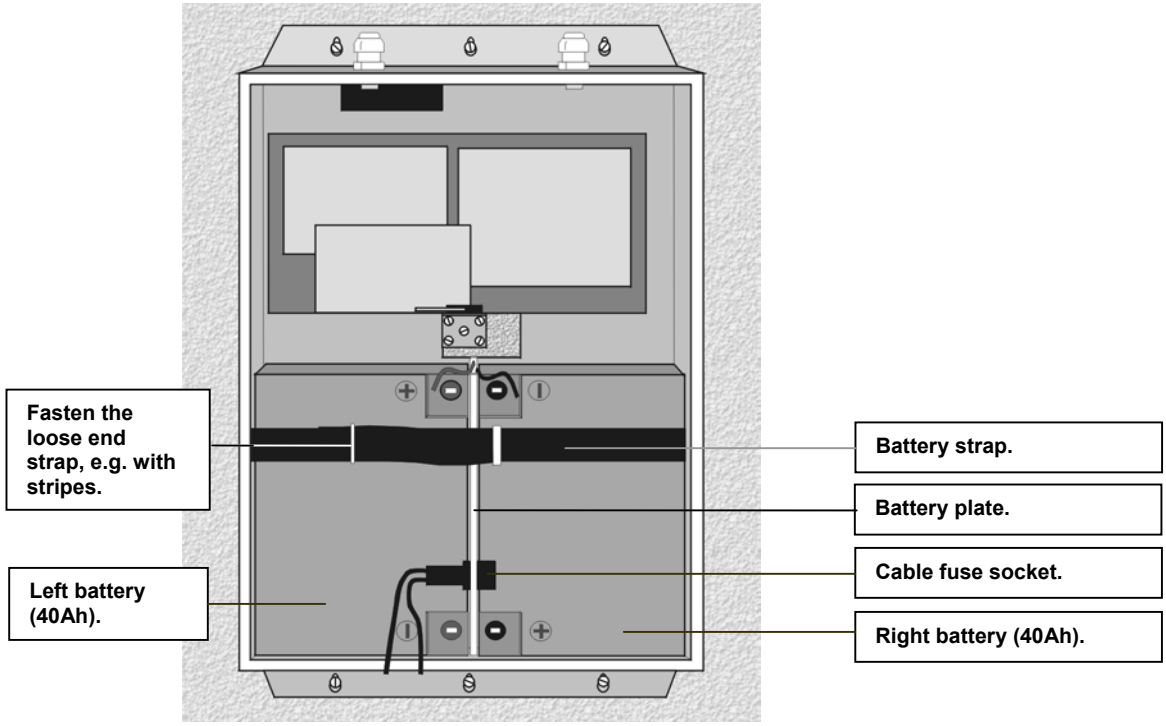
## *Mount the batteries*

Place the batteries in the bottom of the cabinet. The poles should be turned outwards against the door and face each other in the centre of the cabinet (+ against – and – against +).

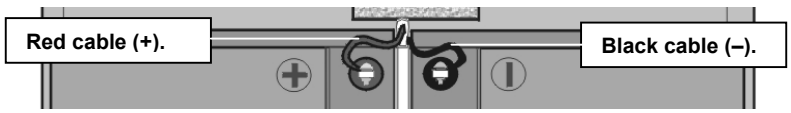
1 First place the left battery in the cabinet's lower left corner.

2 Insert the battery plate with the premounted cables along the battery's right side. Then place the right battery on the other side of the battery plate.

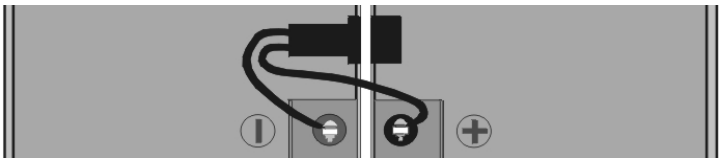
3 Connect the straps over the batteries and tighten them as much as possible.




4 Connect the loose battery cable ends (on top of the battery plate) to the batteries. Connect the red cable to the left battery pole (+). Connect the black cable to the right battery pole (–).




5 Remove the fuse from the cable fuse socket. Connect the battery cables from the cable fuse socket to the battery's lower battery poles, left battery pole (–) and right battery pole (+) respectively.



Do not insert the fuse into the cable fuse socket until all connection is done.

# Connections

## Connect the supply mains network

**Important! Turn off the power from the supply mains network before you connect the cables between the supply mains network and E7.** Connect a switch on the incoming cable from the supply mains network. Place the switch so that it is easily accessible and mark it clearly with a sign. With a switch installed, incoming current can easily be turned off on service and testing.

The cable from the supply mains network should be fused with a separate fuse (6A) in the electricity central.

This is how to connect the cable from the supply mains network:

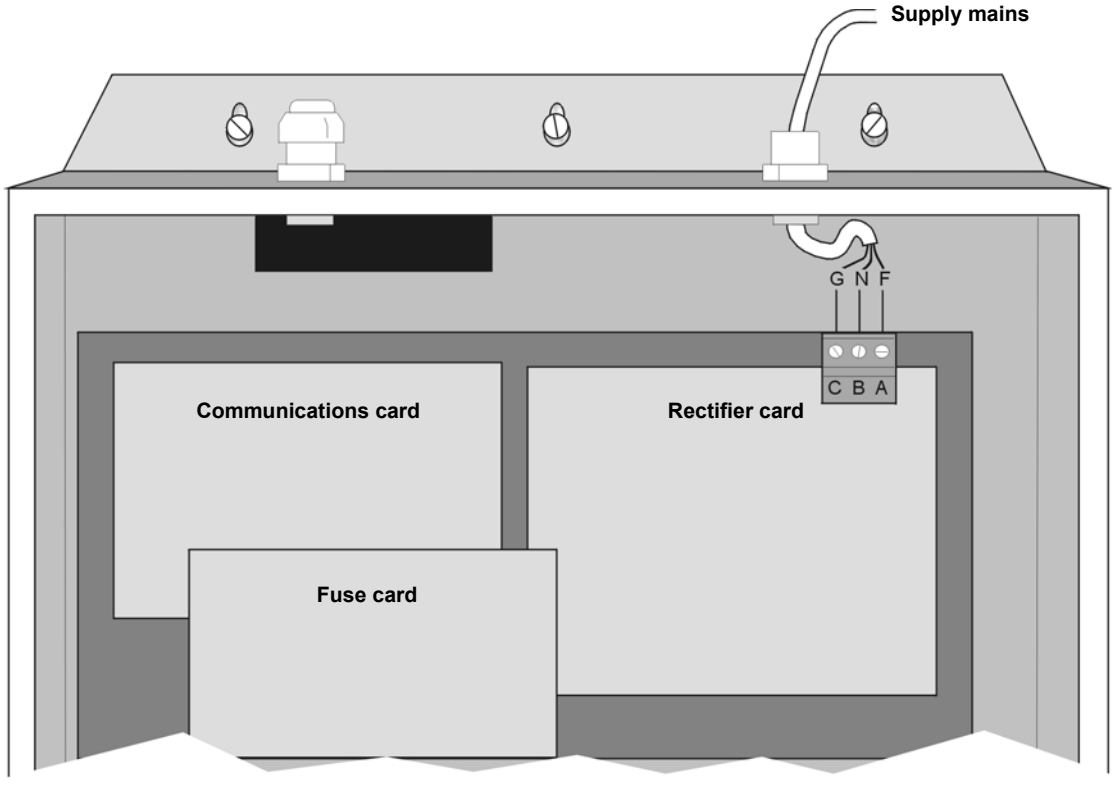
1 Unscrew the plastic lid on the right cable entry on top of the cabinet.

2 Pull the supply mains cable through the cable entry.

3 Connect Phase (F) to block connection A.

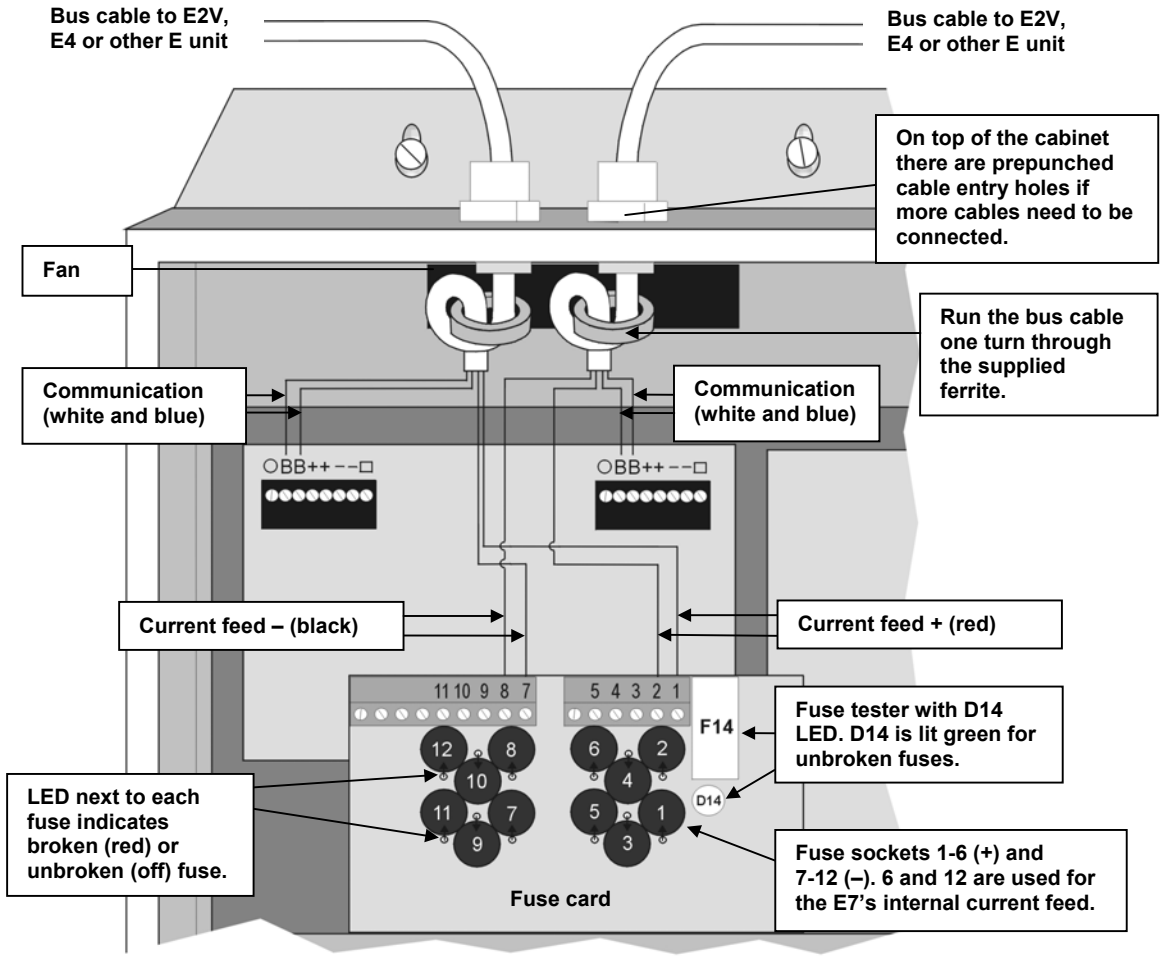
4 Connect 0 (N) to block connection B.

5 Connect protective earth (G) to block connection C.



## *Bus connection*

The next step is to connect communication and current feed cables from the bus to the power supply. In the example below, two bus cables are connected to the power supply. Connect the white and blue cables in the communications pair to the two outputs marked B on the left or right terminal block on the communications card. Then connect the current feed pair (red and black) to the outputs on the fuse card according to the illustration.


Bus cable to E2V, E4 or other E unit
Bus cable to E2V, E4 or other E unit
On top of the cabinet there are prepunched cable entry holes if more cables need to be connected.
Fan
Run the bus cable one turn through the supplied ferrite.
Communication (white and blue)
Communication (white and blue)
Current feed – (black)
Current feed + (red)
11 10 9 8 7
5 4 3 2 1
F14
D14
Fuse tester with D14 LED. D14 is lit green for unbroken fuses.
LED next to each fuse indicates broken (red) or unbroken (off) fuse.
Fuse sockets 1-6 (+) and 7-12 (–). 6 and 12 are used for the E7's internal current feed.
Fuse card

When several cables are connected, the current feed can be connected like this:

| Load (cable) | Connect – (black) to | Connect + (red) to | Fused with fuses |
|---|---|---|---|
| 1 | 7 (–) | 1 (+) | 1 and 7 |
| 2 | 8 (–) | 2 (+) | 2 and 8 |
| 3 | 9 (–) | 3 (+) | 3 and 9 |
| 4 | 10 (–) | 4 (+) | 4 and 10 |
| 5 | 11 (–) | 5 (+) | 5 and 11 |

By fusing connected cables with different fuses, a higher safety of operation is obtained, since cable loops with unbroken fuses continue to work, even if any of the other fuses are broken.

### Connection to other E units

Connect outgoing bus cables from the power supply to the left terminal block in the desired E unit. By connecting the power supply this way, additional power supplies can be added to the installation if required (also see the *Calculate the power supply* chapter).

### Connect the batteries

When all connections described above has been completed, insert the fuse in the cable fuse socket on the battery plate.

## Start-up and test

1 Connect the power supply according to the above instructions.

2 Measure loops and included components in the installation (see the *Measuring* chapter).

3 Switch on the supply mains power. The system starts and goes into operation mode. This is indicated with the D4 LED on the rectifier card turning green.

4 Test the system by switching off the power after a while. The connected load should now be powered by the batteries.

On power failures, the batteries will automatically be disconnected if the battery pole voltage goes below 21V. This is to prevent harmful discharge.

## Alarms

The E7 has the following built-in alarm and protection functions:

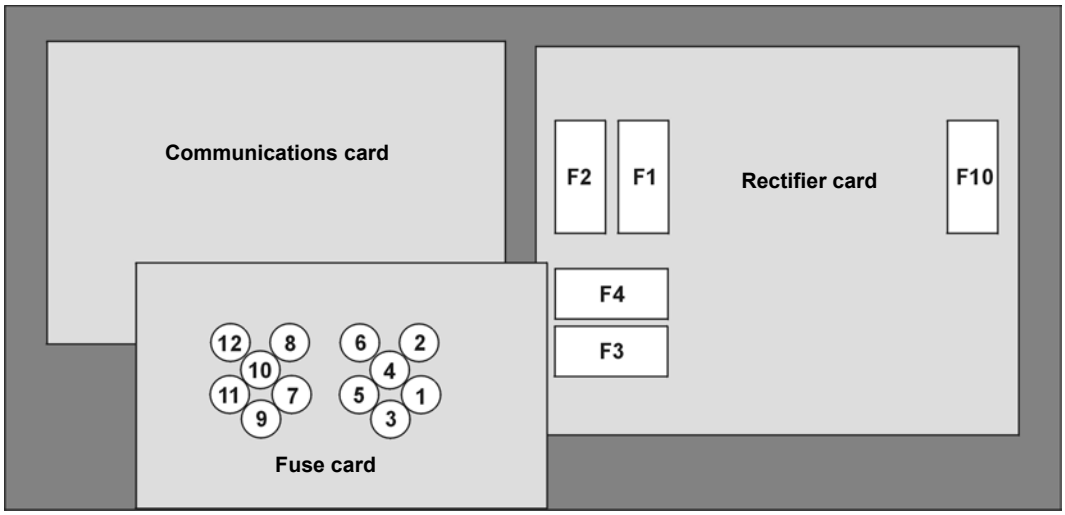
- ***Power failure***. If the power disappears from the supply mains network or if the F10 phase fuse on the rectifier card is broken, an alarm is automatically generated in the Bewator 2010 system.
- ***Low battery***. If battery capacity goes below 75 % or if any of the F1 or F2 main load fuses on the rectifier card is broken, an alarm is automatically generated in the Bewator 2010 system.
- ***Fuse error***. If output voltage is missing or if any of the load fuses are broken, an alarm is automatically generated. Which fuse is broken is indicated with a red LED on the fuse card.
- ***Sabotage***. If the cabinet door is opened or if the cabinet is forced off the wall, the Internal sabotage alarm is automatically generated.

In the operator's program you can define how different alarms should be reported (see the *Operator's Program Installation Manual*).

# Fusing

## Circuit board

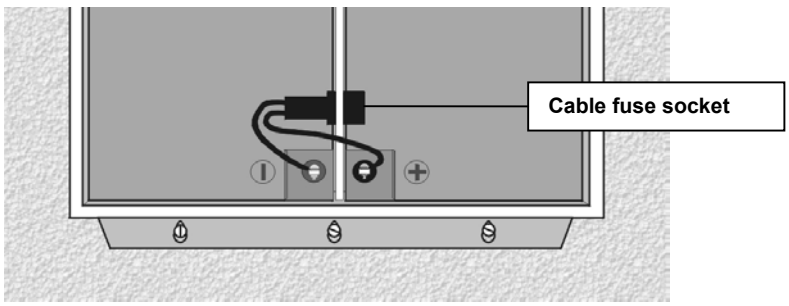
The following fuses can be found on the E7's circuit board:




| Fuses on the rectifier card | Place | Type of fuse |
|---|---|---|
| Supply mains network, Phase IN | F10 | Cheramic T 2.5A |
| Battery (main fuse) +/– | F3/F4 | T 16A |
| Total load (main fuse for cable to fuse card) +/– | F1/F2 | F 5A |
| **Fuses on the fuse card** | **Place** | **Type of fuse** |
| Load out, outputs 1-5 +/– | 1-5, 7-11 | F 2A* |
| Internal feed, communications card and fan +/– | 6/12 | F 2A |

* The factory setting is that outputs 1-5 are fused with F 2A. Depending on the connected load, these can be replaced with other fuses (max 6.3A per output). Fill in the size of the connected load and selected fuses on the sheet supplied with the E7.

## Batteries




| Fuse between the batteries | Place | Type of fuse |
|---|---|---|
| Battery | Cable fuse socket | Cheramic T 6.3A |

# Maintenance

The power supply does not require specific maintenance on installations in room temperature. The batteries should however be changed after the specified lifetime or earlier if the power supply is installed in a hot location.

## Change batteries

This is how to change the batteries:

1 If possible, switch off the supply mains power.

2 Disconnect the batteries by removing the fuse from the cable fuse socket between the batteries.

3 Disconnect the battery cables from the battery poles. Note how they are mounted and make sure they are still attached to the battery plate.
***Note! Avoid short-circuit!***

4 Open the strap securing the batteries.

5 Change the batteries, one at a time, and place the new batteries in the same way, i.e. the poles facing each other and + against – and – against +. Make sure the battery plate is secured between the batteries.

6 Connect the battery cables in the same way as before.
***Note! Avoid short-circuit***

7 Insert the fuse in the cable fuse socket.

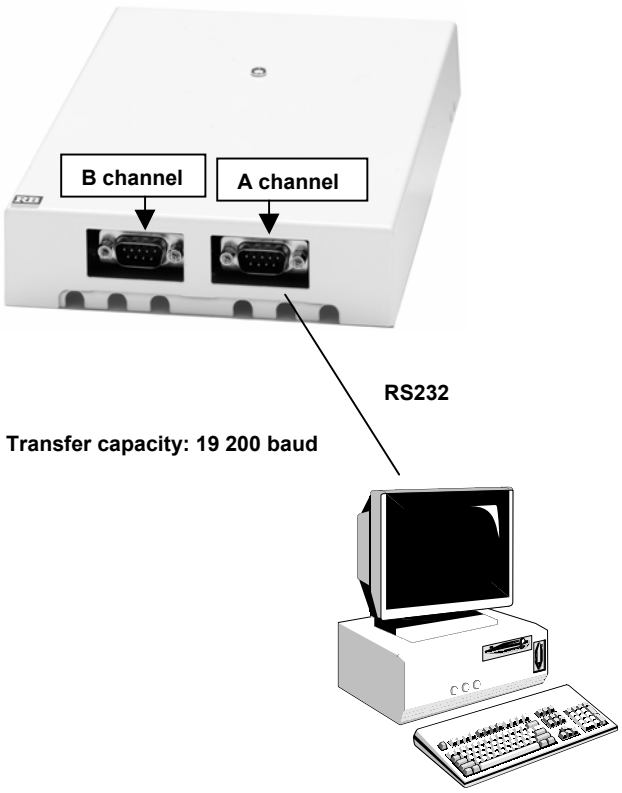
8 Switch on the supply mains power (if it has been switched off). The system starts and goes into operation mode. This is indicated with the D4 LED on the rectifier card turning green.

9 Test the system by switching off the power after a while. The connected load should now be powered by the batteries.

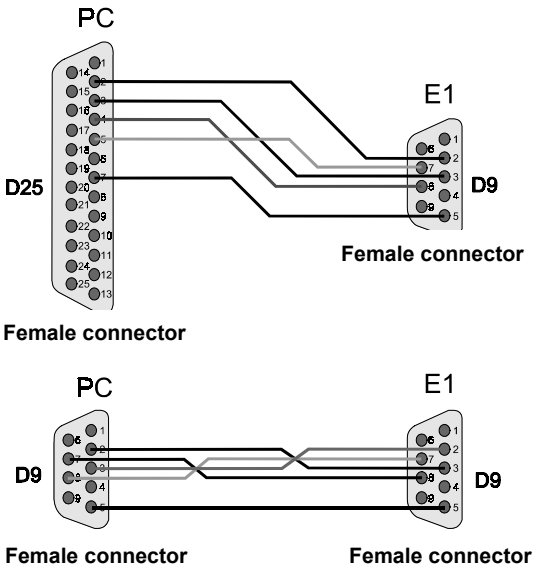
10 Make sure that used lead accumulators are taken care of properly, e.g. returned to the supplier for recycling.

# Connect a PC

To connect a PC, permanently or temporarily, use the A channel in the E1.



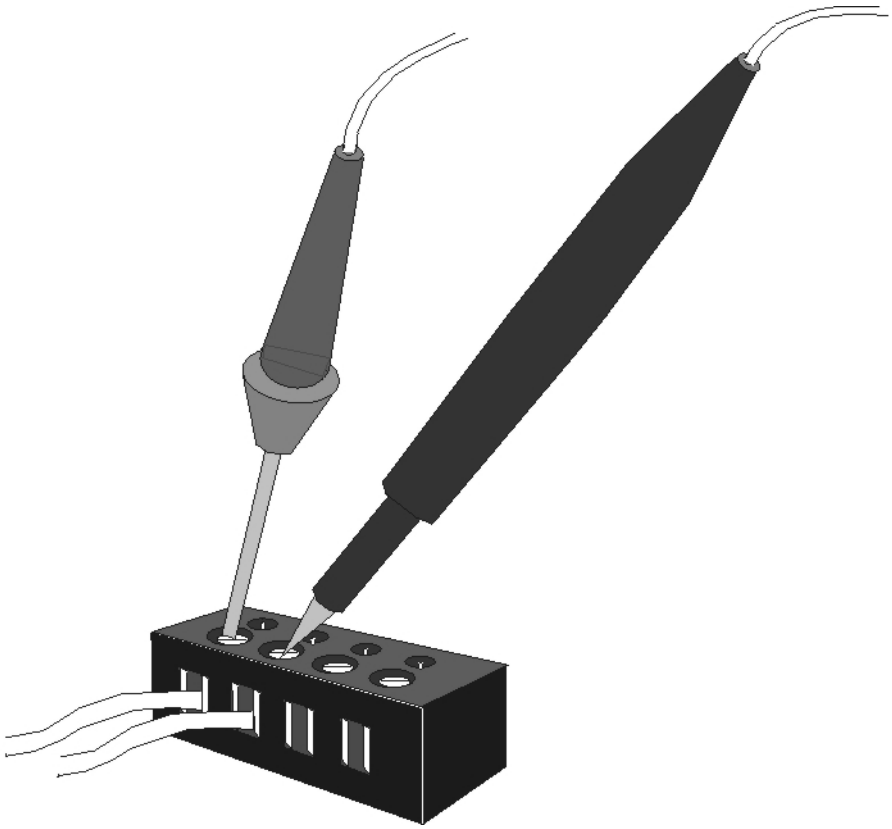

## PC cable




| PC | -> | E1 |
|---|---|---|
| **D25** | | **D9** |
| 2 | - | 2 |
| 3 | - | 3 |
| 4 | - | 8 |
| 5 | - | 7 |
| 7 | - | 5 |
| **D9** | | **D9** |
| 2 | - | 3 |
| 3 | - | 2 |
| 5 | - | 5 |
| 7 | - | 8 |
| 8 | - | 7 |

# Measuring

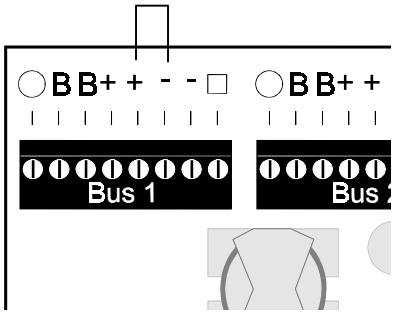
When all cables and components are connected, you should measure resistance and voltage. Use a digital multimeter and measure on the terminal blocks according to the picture below:



The table values in this section are approximate.

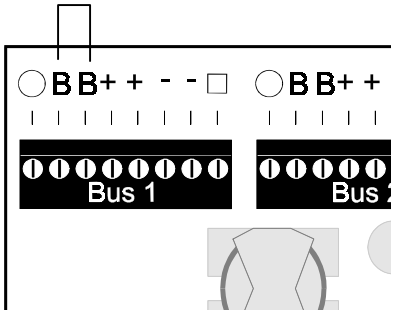
## Voltage

Before connecting the power to the system, check that it is not short-circuited by measuring between + and – on a bus terminal block in each cable segment.



# Communication

Measure the communication cable's resistance on one bus terminal block in each cable segment. Measure inputs marked B on the same terminal block.




The following reference values apply:

| Communication | |
|---|---|
| 50 Ω | Normal condition |
| 100 Ω | Only one 100 Ω resistor connected |
| Infinite resistance | No resistor connected, or interruption |
| < 50 Ω | Too many resistors connected or short-circuit |

# Earthing

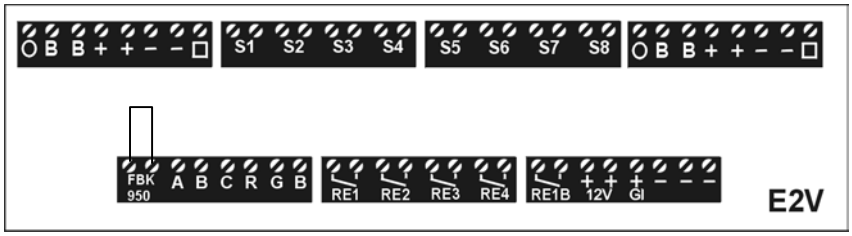
If a screened cable is used and the screen is connected to the nodes and to an earthing point in the installation, you can measure resistance as follows:

Measure the resistance between the screen and the earthing point you have in mind. If the screen is already earthed, remove the screen from the earthing point before measuring.

If the resistance is infinite, connect the screen to the earthing point. If another value is obtained, the screen has an unwanted earth contact somewhere in the system.

# Keypads

Measure the keypads on the nodes where they are connected. Measure on the FBK input according to the picture below:




## Resistance

Before you measure the resistance, disconnect the terminal block from the circuit board.

The following reference values apply:

| **FBK input** | |
|---|---|
| 9.5 KΩ | Normal condition |
| 0 | Short-circuit |
| Infinite resistance | Interruption |
| **On keypress on key 4 on the keypad** | |
| 1 KΩ | Normal value |

## Voltage

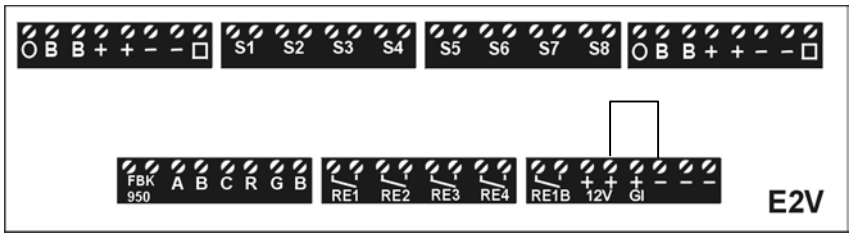
Reconnect the terminal block and measure voltage.

The following reference values apply:

| **FBK input** | |
|---|---|
| 9.5 V | Normal condition |
| 0 V | Short-circuit |
| 12.5 V | Interruption |
| **On keypress on key 4 on the keypad** | |
| 3 V | Normal value |

# 12V equipment

Measure all equipment requiring 12V voltage, e.g. card readers, sirens and PIR detectors. For a description of how to measure loops, see the loops sections further on.




## Resistance

Before you measure the resistance, disconnect the relevant terminal block.

The following reference values apply:

| +/- | |
|---|---|
| < 60 Ω | Power consumption too high |
| 0 | Short-circuit |

## Voltage

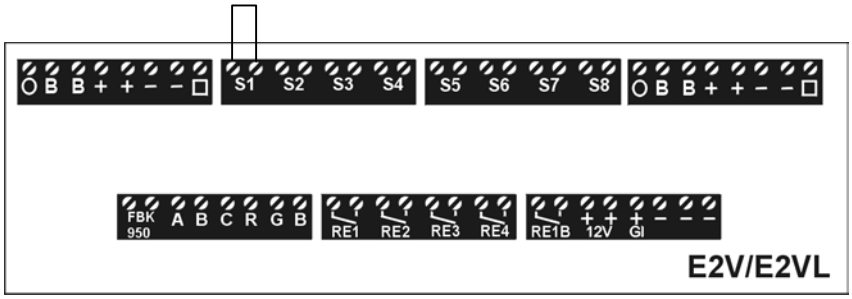
Reconnect the terminal block and measure voltage.

The following reference values apply:

| +/- | |
|---|---|
| 12,5 V | Normal condition |
| 0 V | Short-circuit on equipment connected to 12V. Disconnect one power consumer at a time. When the error disappears, it is the latest disconnected power consumer that need fixing. |

# Double-balanced loops

The next step is to measure inputs (S1-S8) with adhering loops.




## Resistance

Before you measure the resistance, disconnect the relevant terminal block.

The following reference values apply:

| Loop | |
|---|---|
| = < 1.5 K Ω | Short-circuit |
| 2.2 K Ω | Normal condition |
| > = 4.4 K Ω | Detector in alarm condition |
| > 20 KΩ | Interruption |

## Voltage

Reconnect the terminal block and measure voltage.

The following reference values apply:

| Loop | |
|---|---|
| 6 V | Normal condition |
| 0 V | Short-circuit |
| 8.5 V | Detector in alarm condition |
| 12.5 V | Interruption |

# Current loops

## Resistance

The following reference values apply:

| Loop | |
|---|---|
| < 250 Ω | Short-circuit |
| < 5 K Ω | Detector in alarm condition |
| 10 K Ω | Normal condition |
| > 18 K Ω | Interruption |

## Voltage

The following reference values apply:

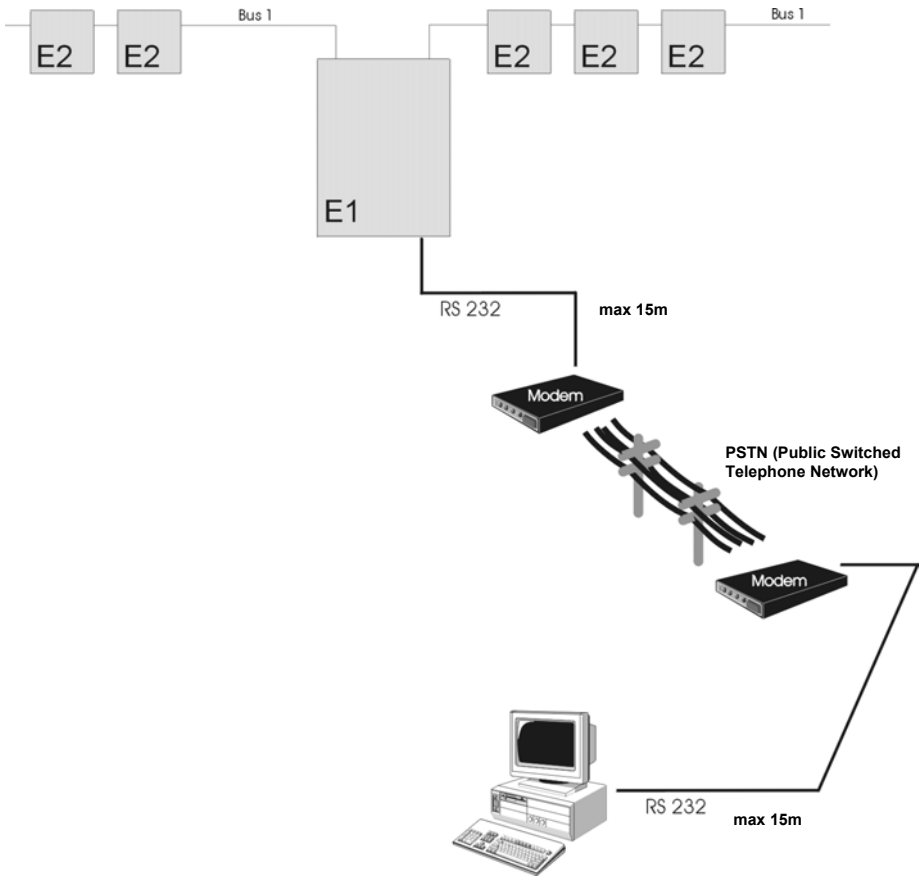
| Loop | |
|---|---|
| Ca 12 V | Normal condition |
| 0 V | Short-circuit |
| 8.6 V | Glass breakage detector GBD 300 in alarm condition |
| 4.8 V | Smoke detectors 2151E or 1151E in alarm condition |
| 12.5 V | Interruption |

# Modem and network connection

This chapter describes different examples of remote systems. Make sure the same version of Bewator 2010 is installed in all computers connected to an E1. In addition, the PC database must correspond to the E1's program memory. Otherwise, the installation may not function properly. There are however exceptions when the operator's program is used in a computer network (see the *Network connection* section further on).

## Modem connection

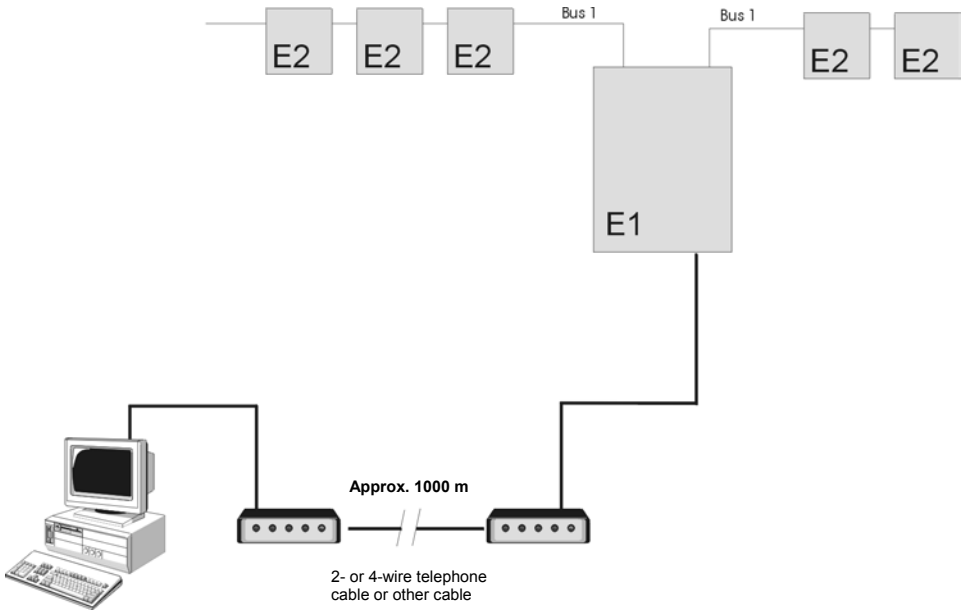
Whenever a remote connection via the PSTN network (Public Switched Telephone Network) is desired, a pair of dial-up modems can be used. Connect one modem to the E1 and the other to the computer. Modems and the suitable communication software can be obtained from Bewator. For a safe modem connection, the signal is encrypted (with login). This prevents unauthorized persons from accessing the system. If printouts of alarms is desired at the computer location, connect the printer to the computer's printer output. Remember to keep the cables short, from the E1 unit to the modem and from the modem to the PC.



## *Short range modems*

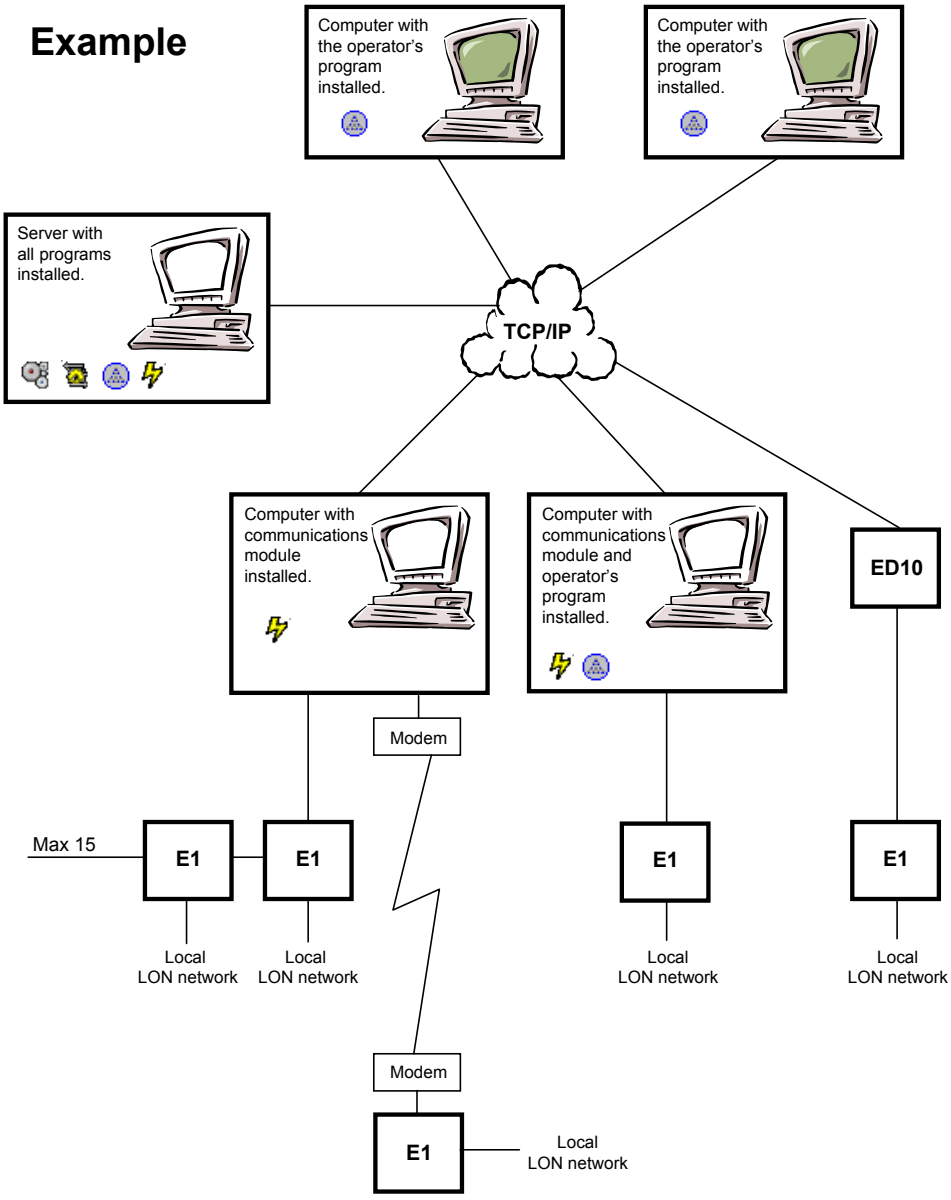
A short range modem can be compared to an amplifier, placed between the E1 and the PC. This modem type does not have to dial since it is always online. There are many types of short range modems. Some require four-wire transfer and some two-wire transfer.

Generally, a pair-twisted cable should be used between the short range modems. The distance between the modems can be up to approximately 1000 m. See the modem's specification, since different modems have different function and performance. The transfer capacity is 19 200 baud.



# Network connection

If Bewator 2010 is used in a computer network, we recommend that you contact Bewator for investigation, support and start-up. On network communication, the operator's program should be installed on a network server. The program is designed for TCP/IP based networks, e.g. Windows NT. For the network clients to be able to communicate with the system, the operator's program licence must correspond to the number of desired users/licences.

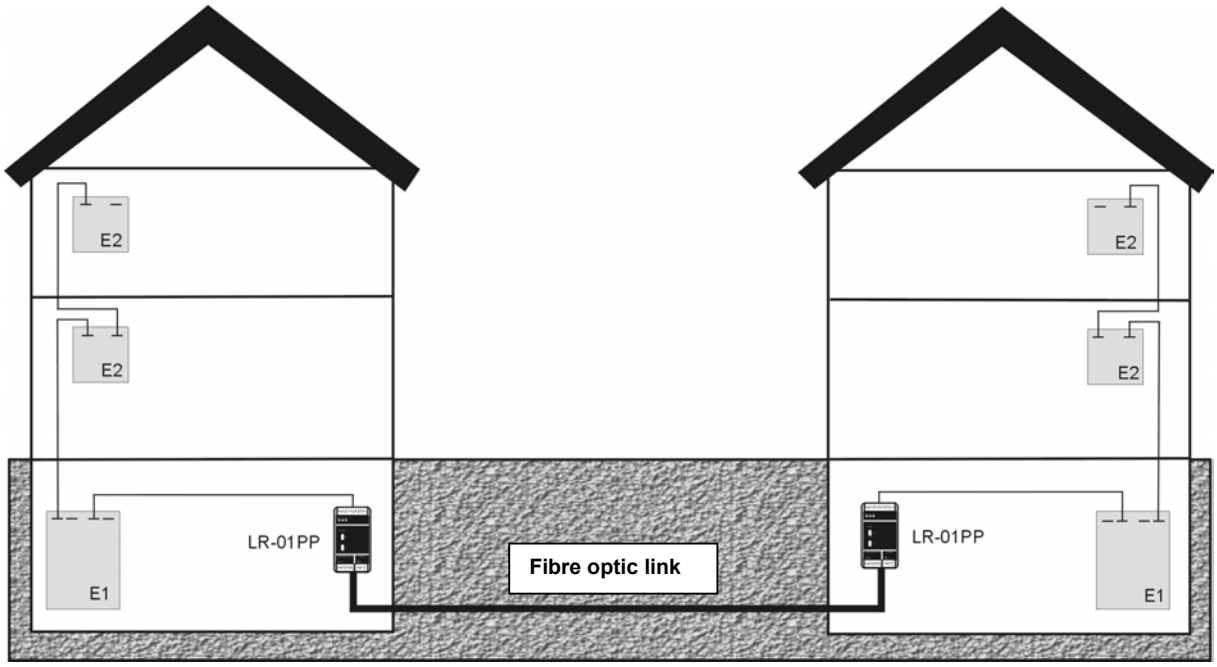


# *Link via fibre nets*

Wherever fibre nets are available or in installations where the distance between two points is several kilometres, any of the fibre optic repeaters LR-01 or LR-01PP (PP = point to point) can be used to join two Echelon buses.

For transfer from one point to another, two LR-01PP are needed. If more than two LON networks should to be joined, the LR-01 repeater can be used (see example on next page).

The illustration below shows how communication can be linked from house to house via LR-01PP. The repeaters are connected to one E1 each, via backbone, which gives higher security. If for example the fibre cable should be dug off, the nets in each house will continue working, even if they are not in contact with one another.

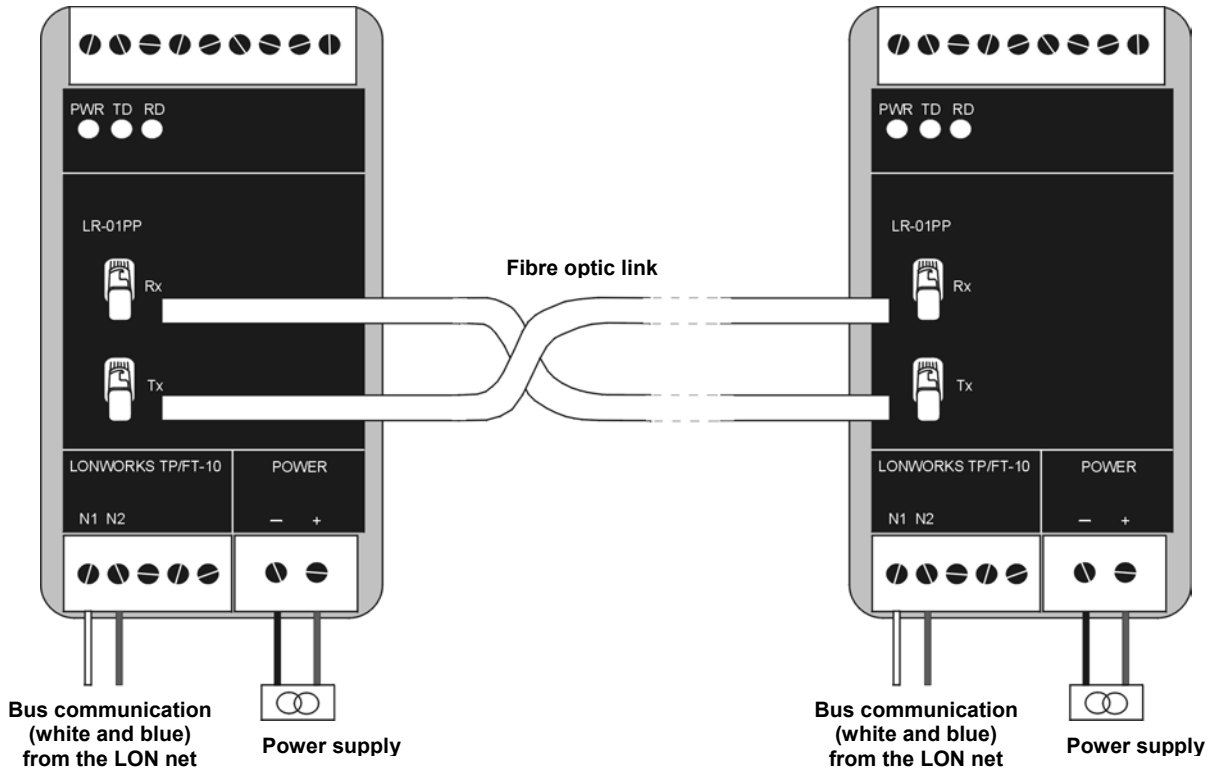



The losses in a fibre cable are very little. When single-mode fibre is used, the distance can stretch up to 25 km.

Also see the wiring diagram on the next page.

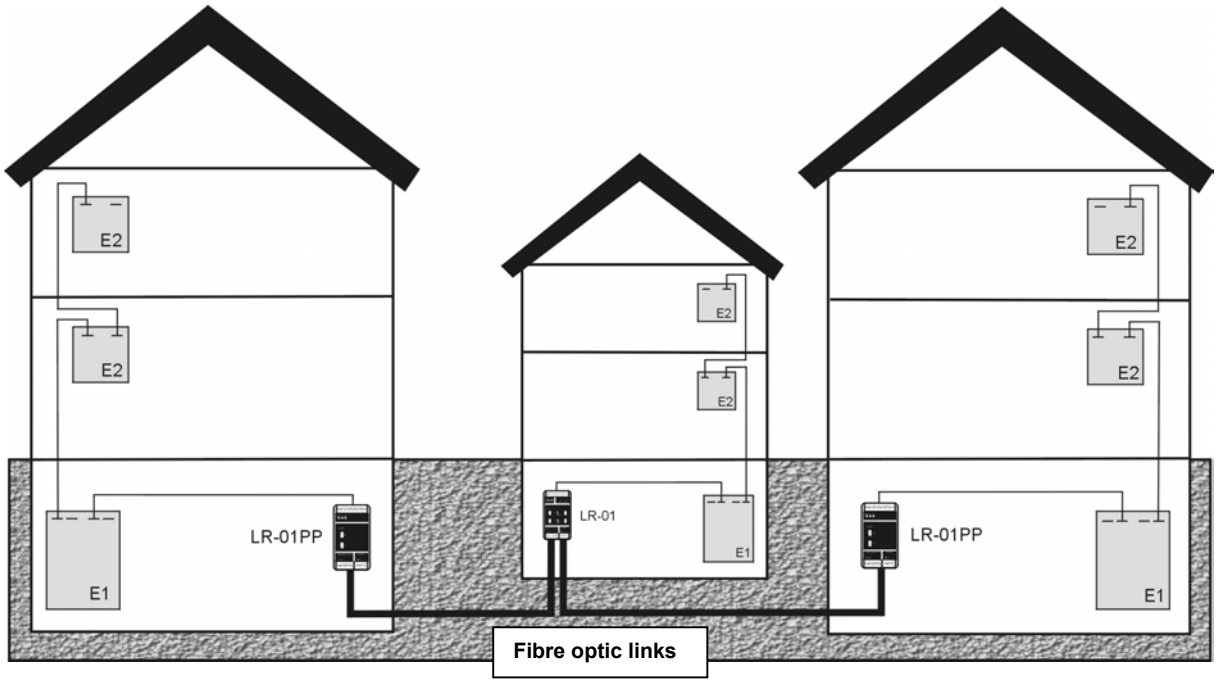
## Connection (point to point)

The diagram below shows how the fibre optic link is connected between the LR-01PP units and how the bus communication from a unit (e.g. E1) in the LON net is connected to the N1/N2 connections in LR-01PP.



## *Several LON networks*

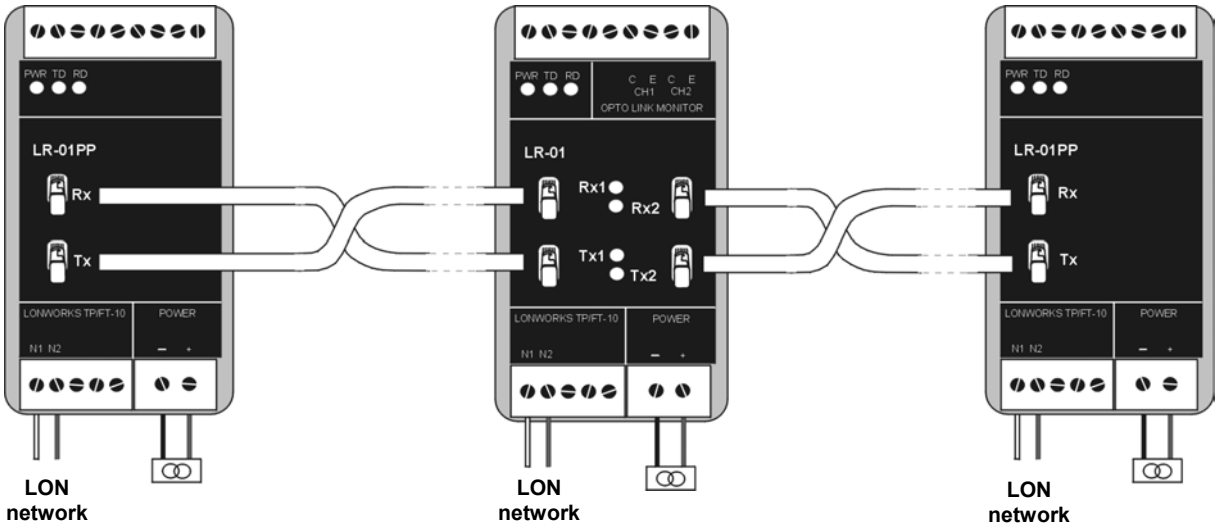
When several LON networks should be joined, LR-01 is used. LR-01 has two sets of fibre optic ports. In the example below, the LON networks in three different houses are joined via the LR-01 unit in the middle house and two LR-01PP units in the houses to the left and right.




Also see the wiring example on the next page.

## Connection (several LON networks)

When several LON networks are joined, the fibre optic links can be connected like this (corresponds to the example with three houses on the previous page):




Up to 10 LON networks can be connected using LR-01-repeaters and several topologies are possible. For information about limitations concerning maximum number of LR-01 repeaters, distance between units, maximum total distance etc, see the LR-01/LR-01PP installation manual.

# Word list

| | |
|---|---|
| Alarm area | An alarm area consists of a geographical area monitored by one or several alarm inputs. An alarm area can be included in several alarm groups. |
| Alarm group | An alarm group consists of one or several alarm areas. An alarm group can be operated with a code, card or system control functions. |
| Alarm log | The alarm log is part of the system's memory database, where events are stored. In Bewator 2010, all occurred events are stored both in the E1 and on the hard disk of a connected PC. The alarm log can be studied in the operator's program. Selected parts are displayed on the E4 control board. |
| By-pass unit | A by-pass unit is a control unit used to set or unset an alarm system. A by-pass unit can be a keypad, card reader, microswitch etc. |
| E1 | E1 is the central unit in the Bewator 2010 system, i.e. the unit used as a communications link between the LON net and the PC.<br><br>If a PC is connected to the E1, the operator will get a user-friendly tool where the system's functions can be controlled and monitored. Bewator 2010 can be used without a PC, but a PC is required to install and administer the system.<br><br>A PC, modem or ED-10 network adapter can be connected to the A channel on the E1. |
| E2 | Two variants of the E2 unit are available (E2V and E2VL). The differences are described in the sections *Install the E2V* and *Install the E2VL* respectively. The E2's have inputs for alarm and monitoring and control outputs for functions like sirens, door operation etc. E2V also has inputs to connect keypads and card readers for entry and alarm operations. |
| E4 | The E4 is a control panel including a display and LED indicators. By reading the E4 display, the alarm log and alarm area status can be studied and alarm inputs can be set passive. The E4 reports in plain text when abnormal conditions occur and what was the cause. |

| | |
|---|---|
| E5 | If the bus cable includes many branches or if more than 40 nodes are connected to the bus, it is recommended to connect an E5 repeater to divide the bus into different cable segments. If a short-circuit or interruption occurs in a cable segment, the remaining cable segments will continue working as usual. |
| E6 | The E6 is a relay node with 8 relay outputs. The relay outputs can be defined for any purpose in the system and control optional functions like alarm indication, lift control and other system-related or general control functions. |
| E7 | The E7 is a power supply designed with the latest primary switch technique to guarantee a high safety of operation and a long life for both electronics and batteries. One or several E7s can be connected to Bewator 2010 to power the installation. |
| Error when setting the alarm | This type of error occurs when an input is in triggered condition or tamper condition when the alarm is set or reset. The cause of the error can e.g. be an open window. The error is displayed to notify the user that an abnormal condition is at hand. |
| | Input An input in a node with one or several connected sensors, e.g. alarm detectors. In the operator's program, each input can be given an address and name, e.g. SMOKE.ENTRANCE. The name identifies the triggered inputs location in an alarm situation. |
| LON | Local Operating Network. A communication technique where several components are connected in parallel to one communication system, a bus. A continuous bus cable is a local network, LON. The bus network can be compared to a communications highway, with slipways and exits to different connected communicating units. This way, all connected components can receive and send information. |
| | In the LON net. several different LON based systems can co-exist. A division between different systems on the same bus can be obtained through a division into different domains or subnets. Domains and subnets are logical nets. Dividing the system into different domains will separate the system. Dividing the system into different subnets enable the systems to exchange information. In Bewator 2010, the division into different domains and subnets is completely free. Communication with other LON systems can be made possible using SNVT (Standard Network Variable Type). |

| | |
|---|---|
| Loop | A loop is a cable connecting alarm detectors or other types of input functions. Balancing resistors are connected on the loop to detect sabotage on the loop. |
| Node | A node is a communicating unit on the bus, and may consist of all types of Echelon-based products. Nodes in the Bewator 2010 system, are e.g. E1, E2, E4 etc. |
| RB9120 | Keypad with 12 metal buttons. The keypad is suitable for alarm operation but can also be used for access control and different types of control functions. |
| RB9160 | Combined card reader and keypad with 12 buttons. It is primarily designed for access control and alarm operation but can also be used for to control specific functions. Also available as a proximity reader. |
| RB960 | Card reader primarily designed for access control. |
| RBMP2 | By connecting an RBMP2 unit to a relay in an E2 or E6 unit, minute pulses can control secondary clocks. The E1 contains a clock that automatically adjusts to daylight saving time 10 years ahead. |
| Report log | The report log, or event log, is a memory database storing all events in the system. To read the report log, a PC must be connected to the E1. Using the operator's program, events can be searched for in the report log. |

# Technical data

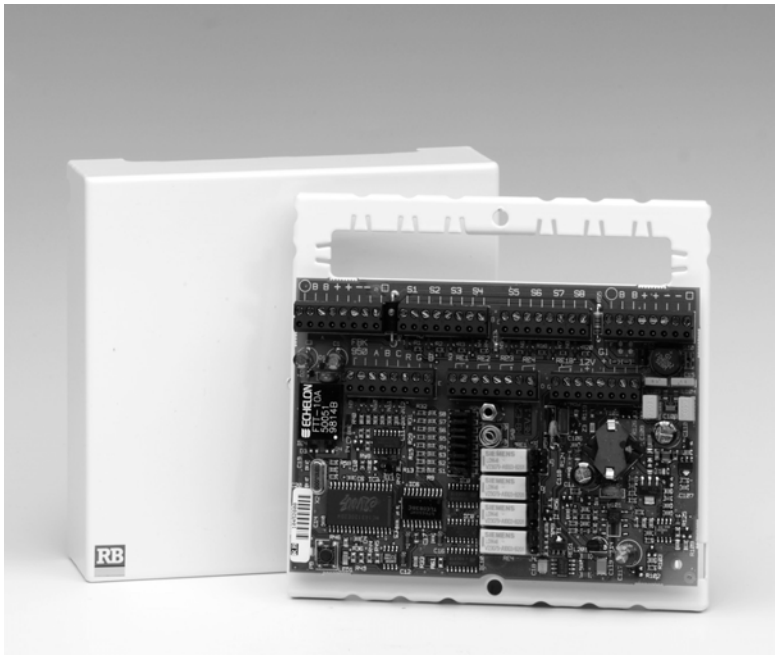
## The RB2010 cable

| | |
|---|---|
| Number of pairs | 2 |
| External diameter | 7.0 mm |
| Sheath | White halogen-free PVC |
| Marking | RB2010 and 1 metre markings |
| **Bus communication pair** | **2 x 0.8 $mm^2$ PVC isolated** |
| Conductor | Plain 1-wire tin-coated copper |
| Communication performance | Corresponding to CAT 4 |
| Screen | Aluminum screen with screen conductor |
| Impedance | 45 ohm at 800 kHz |
| Capacitance | 150 pF/m |
| Other info | Pair-twisted, white/blue |
| **Current feed pair** | **2 x 1.0 $mm^2$ PVC isolated** |
| Conductor | Multi-wire copper, 34 x 1 |
| Current | Max 6A |
| Impedance | 80 ohm |
| Capacitance | 90 pF/m |
| Other info | Pair-twisted, red/black |

# *E1 Communications unit*

| | |
|---|---|
| Voltage feed | 20-60V |
| Power consumption | 77 mA 24V DC |
| Surrounding temperature | +5° C to +40° C |
| Visual indicators | 3 |
| Buttons | 4 |
| Sabotage detection | When unit is opened or removed |
| Bus connection | 2 FTT-10A (Free Topology, Twisted Pair) |
| Bus communication | Echelon LONTalk |
| Calendar function | 10 years ahead |
| Number of connected nodes (local bus) | 79 |
| Number of connected nodes (backbone) | 14 |
| Event log | 3800 events (with standard memory) |
| Number of cards and codes | 2500 (with standard memory) |
| Connection to PC (channel A) | RS232 19.200 baud (9 pole D-sub) |
| Memory expansion | Place for 1 PCMCIA card |
| Connection points, bus | Four 8-pole movable terminal blocks |
| Connection cable | RB2010 or corresponding |
| Size (mm) | W 137 H 210 D 39 |
| Weight | 0.9 kg |

# *E2V Connection unit*

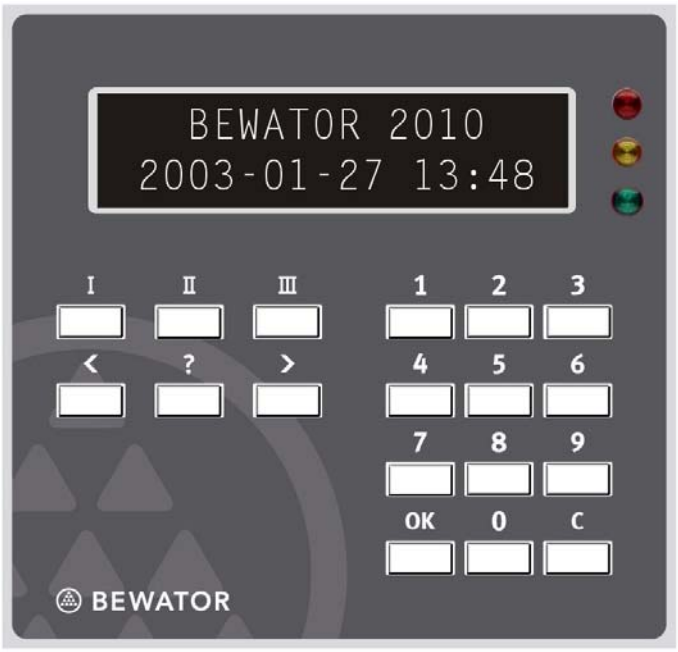


| | | |
|---|---|---|
| Voltage feed | 20-60V | |
| Internal power consumption (quiescent) | Min 50 mA 24V DC | |
| Internal maximum power consumption (all relays active) | 86 mA with double-balanced loop<br>96 mA with current loop | |
| Surrounding temperature | +5° C to +40° C | |
| Visual indicators | 1 | |
| Buttons | 1 | |
| Sabotage detection | When unit is opened or removed | |
| Bus connection | 2 FTT 10 (Free Topology, Twisted Pair) | |
| Bus communication | Echelon LONTalk | |
| Inputs | 8 double-balanced loops (8 inputs) each redefinable to a current loop<br>**or**<br>4 triple-balanced loops (4 inputs) each redefinable to a current loop. | |
| | 1 direct connection for RB9120 (keypad). | |
| | 1 direct connection for RB960, RB9160 or Cotag proximity readers | |
| Outputs | 4 relay outputs for optional use | |
| | 12V output. Current limitation: 225 mA | Total current limitation: 225 mA |
| | 12V output. Current limitation: 100 mA. Voltage feed for e.g. glass breakage detectors with auto reset | |
| | Three 12V max 20 mA acoustic and optical indicator outputs | |
| Connection points, bus | Two 8-pole terminal blocks | |
| Connection cable | RB2010 or corresponding | |
| Size (mm) | W 137 H 131 D 39 | |
| Weight | 0.6 kg | |

# *E2VL Connection unit*

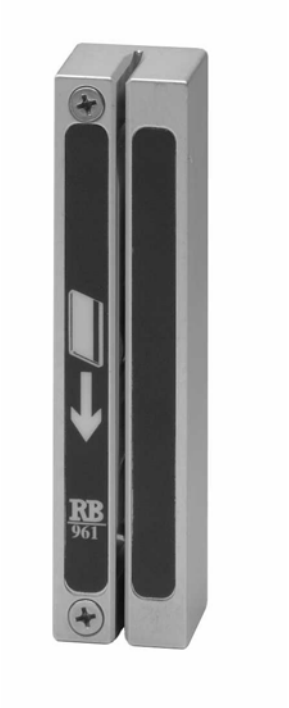
| | | |
|---|---|---|
| Voltage feed | 20-60V | |
| Internal power consumption (quiescent) | 50 mA 24V DC | |
| Internal maximum power consumption (all relays active) | 67 mA double-balanced loop<br>78 mA with current loop | |
| Surrounding temperature | +5° C to +40° C | |
| Visual indicators | 1 | |
| Buttons | 1 | |
| Sabotage detection | When unit is opened or removed | |
| Bus connection | 2 FTT 10 (Free Topology, Twisted Pair) | |
| Bus communication | Echelon LONTalk | |
| Inputs | 8 st double-balanced loops (8 inputs) each redefinable to a current loop<br>**or**<br>4 st triple-balanced loops (4 inputs) each redefinable to a current loop | |
| Outputs | 2 relay outputs for optional use | |
| | 12V output. Current limitation: 225 mA | Total current limitation: 225 mA |
| | 12V output. Current limitation 100 mA, voltage feed for e.g. glass breakage detectors with auto reset | |
| Connections, bus | Two 8-pole terminal blocks | |
| Connection cable | RB2010 or corresponding | |
| Size (mm) | W 137 H 131 D 39 | |
| Weight | 0.6 kg | |

# E4 Control panel



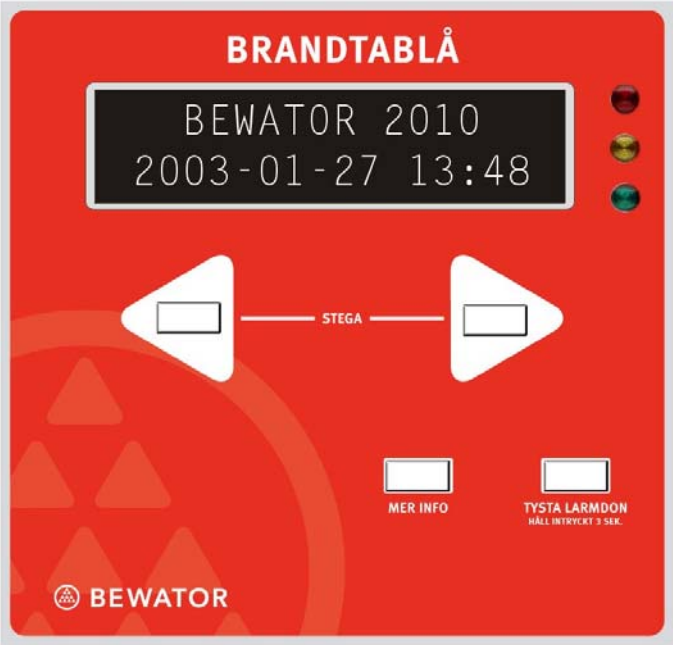

| | |
|---|---|
| Voltage feed | 20-60V |
| Internal power consumption | 48 mA 24V DC |
| Internal maximum power consumption | 48 mA with background lighting and indicators active |
| Surrounding temperature | +5° C to +40° C |
| Display | With background lighting, 2x16 characters |
| Visual indicators | Red, yellow and green LED |
| Acoustc indicator | Buzzer |
| Buttons | 18 |
| Sabotage detection | When unit is opened or removed |
| Bus connection | 1 FTT 10 (Free Topology, Twisted Pair) |
| Bus communication | Echelon LONTalk |
| Inputs | For card reader, e.g. RB961 or PR 500 proximity reader |
| Connections, bus | Two 8-pole terminal blocks |
| Connection cable | RB2010 or corresponding |
| Size (mm) | W 137 H 131 D 39 |
| Weight | 0.6 kg |

# *RB961 Card reader*



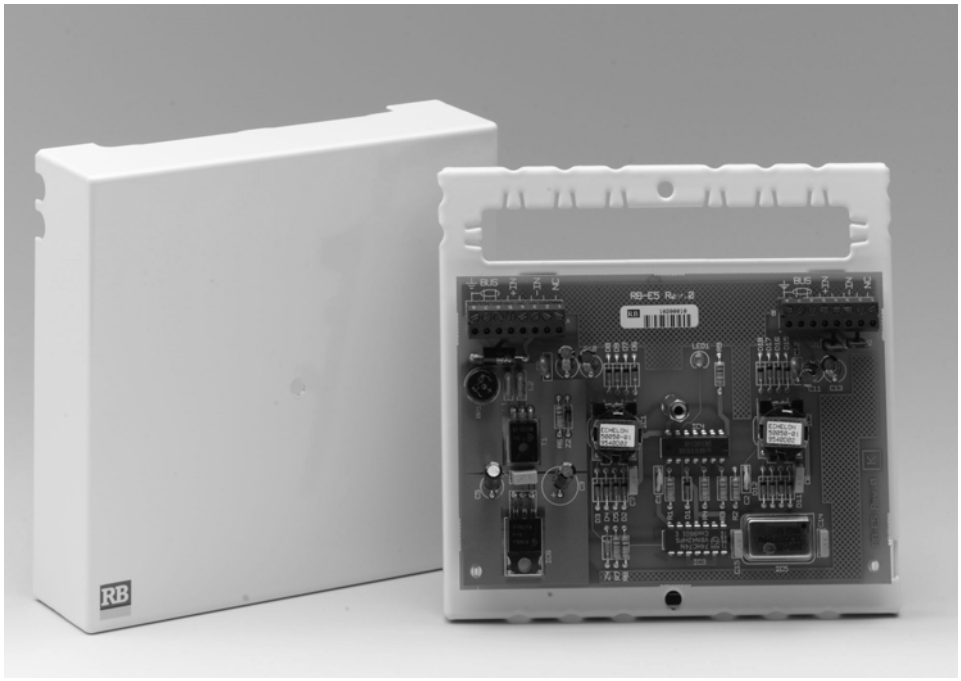

| | |
|---|---|
| Voltage feed | 5V |
| Power consumption | 15 mA |
| Surrounding temperature | +5° C to +40° C |
| Connect to | E4 |
| Cable length | 30 cm |
| Connection cable | 2 x 4 EKKX |
| Reader head performance | 300.000 swipes (normal conditions) |
| Magnetic cards | Type CR-80 HICO, ISO 3554 |
| Reads | Track 2 |
| Size (mm) | W 29 H 120 D 28 |
| Weight | 0.4 kg |

# E4B Fire control panel




| | |
|---|---|
| Voltage feed | 20-60V |
| Internal power consumption (quiescent) | 11 mA 24V DC |
| Internal maximum power consumption | 48 mA with background lighting and indicators active |
| Surrounding temperature | +5° C to +40° C |
| Visual indicators | Red, yellow and green LED |
| Acoustic indicator | Buzzer |
| Buttons | 4 |
| Sabotage detection | When unit is opened or removed |
| Bus connection | 1 FTT 10 (Free Topology, Twisted Pair) |
| Bus communication | Echelon LONTalk |
| Connections, bus | Two 8-pole terminal blocks |
| Connection cable | RB2010 or corresponding |
| Size (mm) | W 137 H 131 D 39 |
| Weight | 0.6 kg |

# *E5 Repeater*

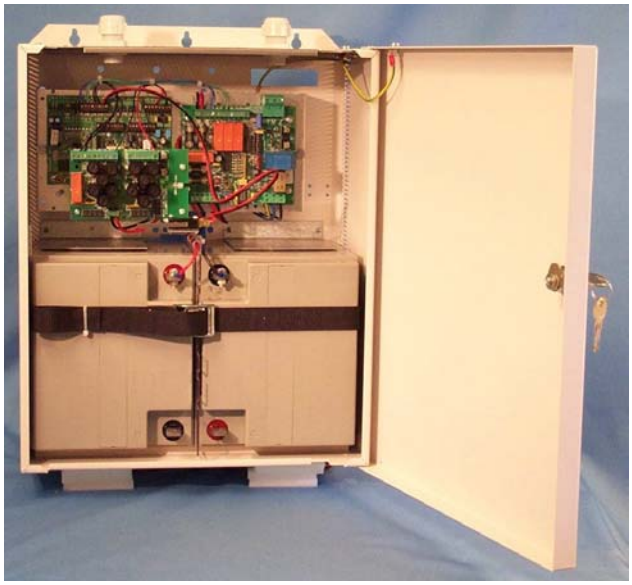


| | |
|---|---|
| Voltage feed | 20-60V |
| Internal power consumption (quiescent) | 37 mA 24V DC |
| Temperatur omgivning | +5° C till +40° C |
| Signal delay | 20 ms |
| Sabotage detection | When unit is opened |
| Bus connection | 2 FTT 10 (Free Topology, Twisted Pair) |
| Bus communication | Echelon LONTalk |
| Outputs | RS485, RS422 or Echelon LONTalk |
| Connections, bus | Three 8-pole movable terminal blocks |
| Connection cable | RB2010 or corresponding |
| Size (mm) | W 137 H 131 D 39 |
| Weight | 0.6 kg |

# E6 Relay node

| | |
|---|---|
| Voltage feed | 20-60V |
| Internal power consumption (quiescent) | 29 mA 24V DC |
| Internal maximum power consumption (all relays active) | 98 mA |
| Surrounding temperature | +5° C to +40° C |
| Visual indicator | 1 |
| Buttons | 1 |
| Sabotage detection | When unit is opened or removed |
| Bus connection | 2 FTT 10 (Free Topology, Twisted Pair) |
| Bus communication | Echelon LONTalk |
| Outputs | Eight voltage free relay outputs<br>12V output, max 200 mA |
| Connections | Four 8-pole movable terminal blocks<br>One 4-pole movable terminal block |
| Connection cable | RB2010 or corresponding |
| Size (mm) | W 137 H 131 D 39 |
| Weight | 0.6 kg |

# *E7 Power supply*



| | |
|---|---|
| Input voltage, frequency | 88V AC-260V AC, 47-63 Hz |
| Nominal output voltage | 27 V DC ± 0.3 V DC |
| Output voltage, ripple | <400 mVp-p |
| Internal power consumption | 136mA 24 VDC |
| Environment | +5° C to +40° C |
| Control accuracy | <100 mV |
| Maximum current | 5 A |
| Standby and recharge time on battery operation | 4 A gives approx. 9.3 h standby time and approx. 72 h recharge time<br>3 A gives approx. 12.5 h standby time and approx. 36 h recharge time<br>2,5 A gives approx. 15.4 h standby time and approx. 15 h recharge time<br>1 A gives approx. 37 h standby time and approx. 10 h recharge time |
| Current limitation | Type 120 % of nominal current |
| Overvoltage protection | Type 125 % of output voltage |
| Constant voltage | I/U according to DIN 41773 |
| Efficiency | Type 85 % |
| Battery capacity | 40Ah (2x12V/40Ah) |
| Battery lifetime | 5-8 years (at 20° C room temperature) |
| Battery type | Maintenance-free valve regulated lead batteries in fire protected casing (according to UL94-V0) |
| Discharge protection | Battery pole voltage (nom. 24V) 21V |
| Housing, sealing | Coated metal cabinet, IP22 |
| Internal cooling | Fan 24V/60mA (1,25W continuous operation) |
| Alarms (potential free relay switching), alarms are linked to the Echelon bus | **Power failure** (incl broken phase fuse)<br>**Low battery voltage** (incl broken main load fuse)<br>**Broken load fuse**<br>**Tamper** (open door/removed casing) |
| Visual indicators | **Rectifier PCB**: Green = OK; Yellow = Faulty charging voltage; Red = Low battery<br>**Fuse PCB**: Red = Broken load fuse, Green = On test of unbroken fuse on fuse tester |
| Size (mm) | W 350 H 460 D 190 |
| Weight | Approx 45 kg with batteries |
| Other info | Also designed for IT Power System in Norway with Phase to Phase voltage 230 V AC |

# RB9160 Card and code reader

| | |
|---|---|
| Voltage feed | 12V |
| Power consumption | 35 mA |
| Surrounding temperature | -25° C to +50° C |
| Visual indicators | Red and green LED |
| Acoustic indicator | Buzzer |
| Buttons | 12: 0-9, A and B |
| Sabotage detection | When unit is opened or removed |
| Connect to | E2V |
| Maximum cable length to E2V | 25 m |
| Recommended connection cable | EKKX 6x2x0,5 |
| Size (mm) | W 107 H 160 D 48 |
| Weight | 1 kg |

# *RB9160 Prox proximity reader*

| | |
|---|---|
| Voltage feed | 12V |
| Power consumption | 43 mA 12V DC |
| Maximum power consumption | 75 mA (during card reading) |
| Surrounding temperature | -25° C to +50° C |
| Visual indicators | Red and green LED |
| Acoustic indicator | Buzzer |
| Buttons | Twelve: 0-9, A and B |
| Sabotage detection | When unit is opened or removed |
| Connect to | E2V |
| Maximum cable length to E2V | 25 m |
| Recommended connection cable | EKKX 6x2x0.5 |
| Size (mm) | W 107 H 160 D 48 |
| Weight | 1 kg |

# *RB9120 Keypad*

| | |
|---|---|
| Voltage feed | 12V |
| Power consumption, quiescent | 15 mA |
| Maximum power consumption | 30 mA |
| Surrounding temperature | -20° C to +55° C |
| Visual indicators | Red and green LED |
| Acoustic indicator | Buzzer |
| Buttons | 12: 0-9, A and B |
| Connect to | E2V |
| Maximum cable length to E2V | 25 m |
| Recommended connection cable | EKKX 4x2x0,5 |
| Size (mm) | W 80 H 140 D 38 |
| Weight | 0.7 kg |

# *RB960 Card reader*

| | |
|---|---|
| Voltage feed | 12V |
| Power consumption | 42 mA |
| Surrounding temperature | +5° C to +40° C |
| Visual indicators | Red and green LED |
| Acoustic indicator | Buzzer |
| Connect to | E2V |
| Cable length | 7 m |
| Connection length | Maximum 25 m |
| Connection cable | 2 x 4 EKKX |
| Reader head performance | 300 000 swipes (normal conditions) |
| Magnetic cards | Type CR-80 HICO, ISO 3554 |
| Reads | Track 2 |
| Size (mm) | W 29 H 124 D 28 |
| Weight | 0.4 kg |

# PR500 Proximity reader

| | |
|---|---|
| Voltage feed | 10,6-32V DC |
| Power consumption | Maximum 100 mA |
| Surrounding temperature | 30° C to +50° C |
| Colour | Stone |
| Material | UV-resistant ABS plastic |
| Read ranges | Approx. 30 cm with IB928 (active card)<br>Approx. 5 cm with IB968 (passive card) |
| Size (mm) | W 40 H 140 D 18.5 |

# *HF500 Hands-free reader*

| | |
|---|---|
| Voltage feed | 10-35V DC |
| Power consumption | Maximum 400 mA |
| Surrounding temperature | 0° C to +50° C |
| Colour | Stone |
| Material | UV-resistant ABS plastic |
| Read ranges | Approx. 1 metre with IB928 (active card)<br>Approx. 15 cm with IB968 (passive card) |
| Size (mm) | W 220 H 265 D 30 |

# BC605 Vandal-proof proximity reader

| | |
|---|---|
| Voltage feed | 4.75-15V DC |
| Power consumption | Max 150 mA |
| Surrounding temperature | -30° to +65° C |
| Casing | Stainless vandal-proof metal casing with front in impact-resistant lexan |
| Interface | Synchronous clock/data connection |
| Reading distance | Approx. 18 cm with IB928 (active card)<br>Approx. 5 cm with IB938 (passive card) |
| Size (mm) | W 100 H 128 D 15 |

# *ED-10 Ethernet Adapter*

| | |
|---|---|
| Voltage feed | 10-74V DC |
| Power consumption | 115 mA 24V DC |
| Environment | + 5° C to + 50° C |
| Connection | Between E1 and computer network |
| Network interface | 10base-T RJ-45 10 Mbit/s |
| Mounting | 35 mm DIN rail |
| Size (mm) | W 55 H 100 D 128 |
| Weight | 0.4 kg |

# RBMP2 Clock module

| | |
|---|---|
| Voltage feed | 12V |
| Power consumption | Approx. 240mW |
| Surrounding temperature | +5° C to +40° C |
| Indicators | 1 |
| Inputs | 1 minute pulse input |
| Outputs | 1 polarity switching pulse output, maximum load 1 A |
| Connect to | E2V, E2VL or E6 |
| Connections | One 8-pole movable terminal block |
| Size (mm) | W 65 H 88 D 29 |
| Weight | 0.08 kg |

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